Mathematics

Grade 5

Government of Nepal

Ministry of Education, Science and Technology

Curriculum Development Centre

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Preface

School education is the foundation for preparing the citizen who are loyal to the nation and nationality, committed to the norms and values of federal democratic republic, self-reliant and respecting the social and cultural diversity. It is also remarkable for developing a good moral character with the practical know-how of the use of ICT along with the application of scientific concept and positive thinking. It is also expected to prepare the citizens who are moral and ethical, disciplined, social and human value sensitive with the consciousness about the environmental conversation and sustainable development. Moreover, it should be helpful for developing the skills for solving the real life problems. This textbook 'Mathematics, Grade 5' is fully aligned with the intent carried out by the National Curriculum Framework for School Education, 2076 and is developed fully in accordance with the new Basic Level Curriculum, 2078.

This textbook is initially written by Mr. Narahari Acharya, Mr. Dev Narayan Yadav, Mr. Jagannath Adhikari and Mr. Ram Chandra Dhakal. It has been translated by Mr. Narahari Acharya, Mr. Sujan Kafle and Mrs. Ritu Shrestha. The contribution made by Director General Mr. Baikuntha Prasad Aryal, Dr. Hari Prasad Upadhaya, Mr. Gyanendra Ban, Mrs. Anupama Sharma, Mr. Nabin Poudel, Mr. Shatya Narayan Maharjan, Mrs. Pramila Bhakati and Mr. Ram Chandra Dhakal is remarkable in bringing the book in this form. The language of the book has been edited by Mr. Matrika Subedi. Art editing of this book was done by Mr. Shreehari Shrestha by making it four colour. The Curriculum Development Centre extends sincere gratitude to all of them.

The textbook is a primary resource for classroom teaching. Considerable efforts have been made to make the book helpful in achieving the expected competencies of the curriculum. Curriculum Development Centre always welcomes constructive feedback for further betterment of its publications.

2080 BS

Curriculum Development Centre
Sanothimi, Bhaktapur

Contents

Lesson 1

Lines and Angles

1.0 Review

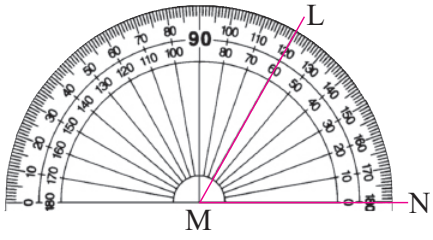
Look at the pictures given below and discuss the questions

a) What do you see in the pictures?

b) Write are the names of the angles given in the pictures?

c) What is the measure of the angles in the given pictures?

(i)



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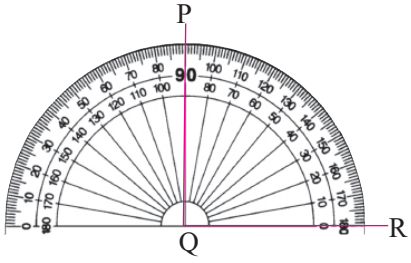

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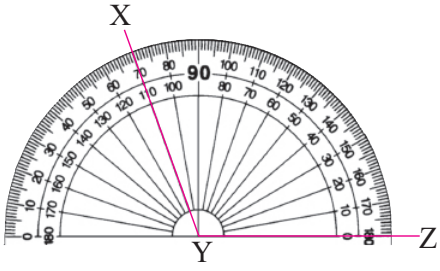

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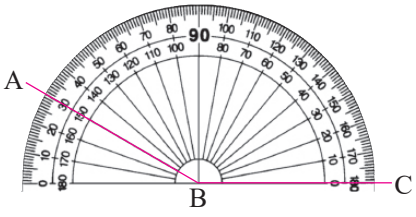


1.1 Measurement and Construction of Angle Using Protractor

(A) Measurement of Angle

Activity 1

Work in pairs. Take a protractor. Observe the protractor and discuss the following questions.

i) What is the structure of the protractor?

ii) How many numbers are there in the protractor?

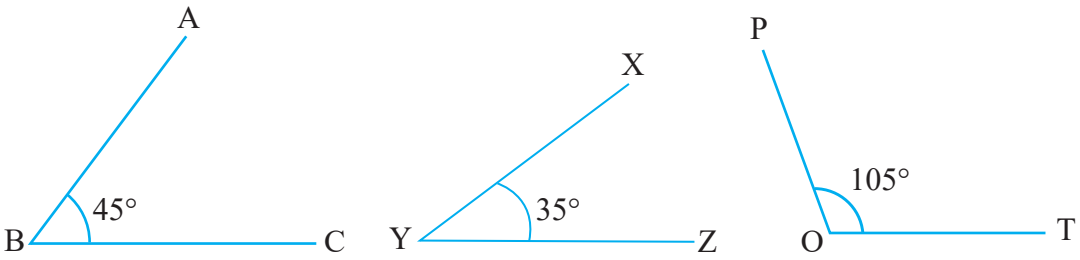
iii) What does the small lines in protractor mean?

iv) What is the protractor used for? How is it used?

Activity 2

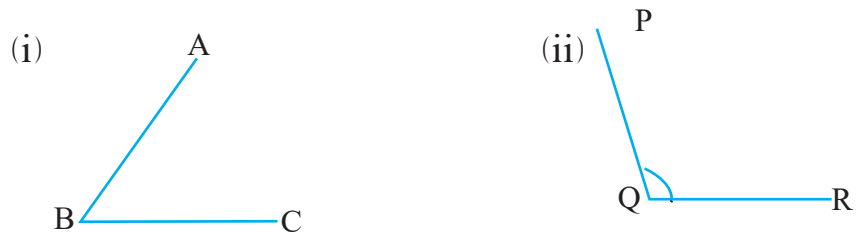
From groups. Each group measures the angle given by your teacher in turn using a protractor. Did all groups get the same measure? Verify it. If there is different measure in any group then discuss in a group, and solve it.

For example:



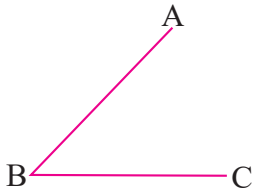
Activity 3

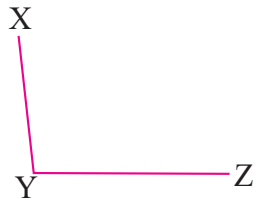
Sit in a pairs with your friends. Draw an angle by using a ruler and give it to your friend to measure it by using a protractor and show it to your friends in pair. Check whether your friend measured it correctly or not. Take a help of the teacher or other friend as needed.



Example 1

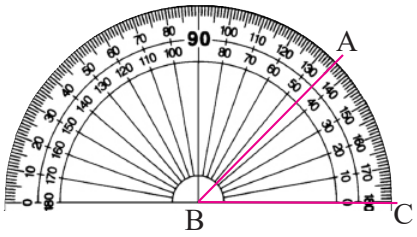
Find the measure of each angle given below using protractor:

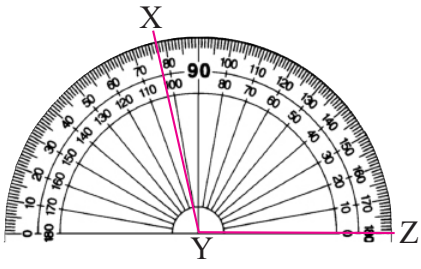




Solution:

Here,





When the side BC of an angle ABC is put exactly on the **base line** of the protractor, AB touches the protractor at 45. Therefore, $\angle ABC = 45°$

Similarly, when the side YZ of an angle XYZ is put exactly on the base line of the protractor, XY touches protractor at 103, therefore, $\angle XYZ = 103°$.

(B) Construction of Angle

Activity 4

How to construct an angle of 25 using protractor?

(i) Construct the base line segment PQ using a ruler.

Figure (a)

Figure (b)

(ii) Put the center of the protractor at the point P and **base line** of the protractor exactly on the segment PQ as shown in the figure (a) below. Similarly, put the center of the protractor at the point Q and **base line** of the protractor exactly on the segment QP as shown in the figure (b) below.

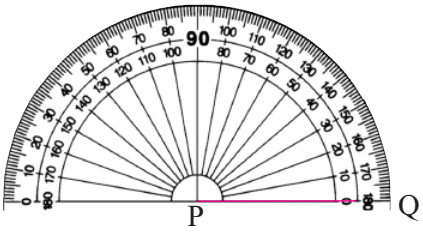


Figure (a)

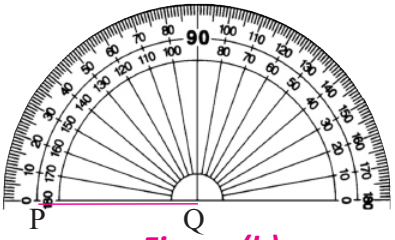


Figure (b)

(iii) From the base line PQ in protractor, count from 0 to 25 and mark the point on 25 in the figure (a) given below. Name the marked point R.

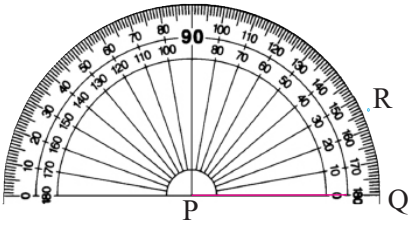


Figure (a)

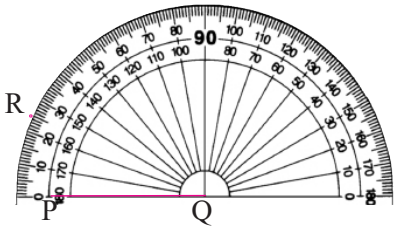
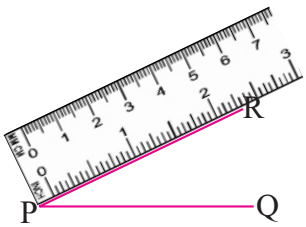
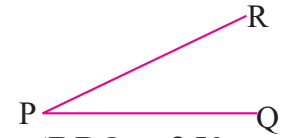


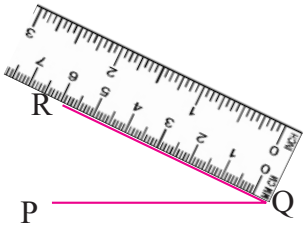
Figure (b)

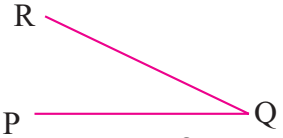
(iv) After removing the protractor, join the points P and R in figure (a) and R and Q in figure (b) with the help of a ruler and a pencil.





$\angle RPQ = 25°$





$\angle RQP = 25°$

Example 2

Construct the angles given below using protractor.

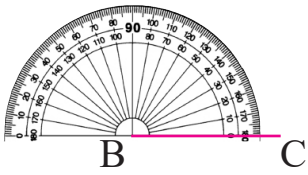
(i) $\angle ABC = 35°$ (ii) $\angle PQR = 78°$ (iii) $\angle XYZ = 150°$

Solution:

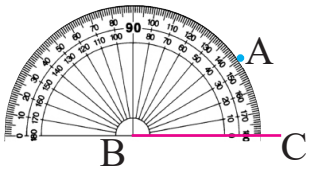
(i) Here, to construct $\angle ABC = 35°$ use the following steps,

(a) Draw line segment BC.

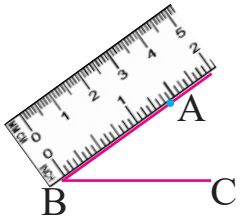
(b) Place the center of the protractor to the point B of the segment BC and the base line of protractor on the segment BC.



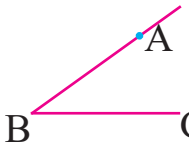
(c) Look at the number from 0 of the base line of the protractor and mark it on the line indicating 35°. Name this point A.



(d) Remove the protractor and join the points A and B using ruler.

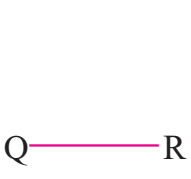


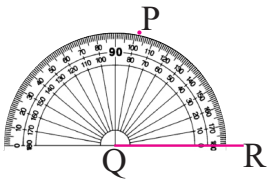
(e) Required $\angle ABC = 35°$ is prepared.

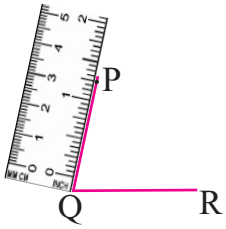


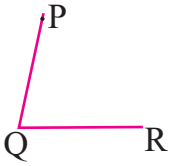
Similarly, while drawing the rest of the angles,

(i) $\angle PQR = 78°$

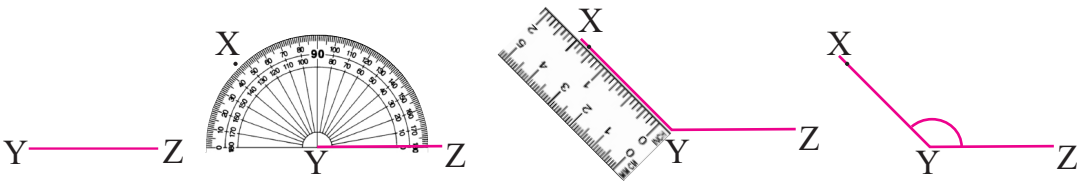








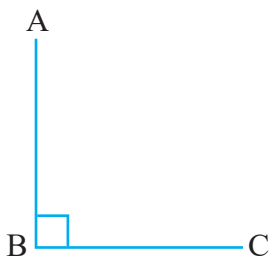
(iii) $\angle XYZ = 135°$



Exercise 1.1

1. Estimate the measure of the angles given below. Write their measures in degree using protractor.

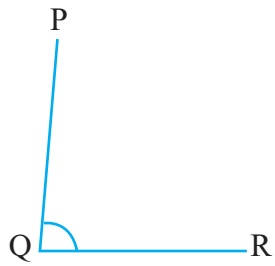
(a)



Estimated measure ☐

Actual measure ☐

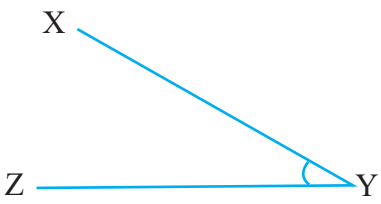
(b)



Estimated measure ☐

Actual measure ☐

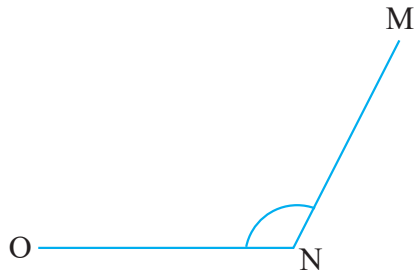
(c)



Estimated measure ☐

Actual measure ☐

(d)



Estimated measure ☐

Actual measure ☐

2. Construct the angles of the following measure using protractor and name it.

(a) 35°	(b) 45°	(c) 60°
(d) 75°	(e) 90°	(f) 115°
(g) 120°	(h) 130°	(i) 180°
(j) 47°	(k) 89°	(l) 153°

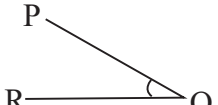
3. Construct the angles of following measures using protractor.

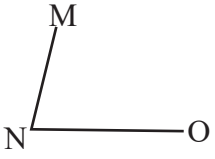
(a) $\angle ABC = 50°$ (b) $\angle PQR = 65°$ (c) $\angle XYZ = 110°$

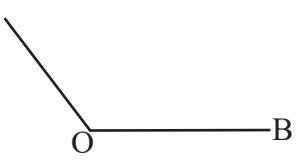
(d) $\angle MNO = 145°$ (e) $\angle KLM = 180°$ (f) $\angle PQR = 37°$

(g) $\angle DEF = 148°$

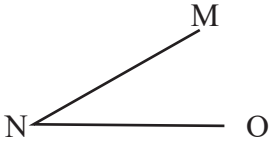
4. Find the measure of the angle given below and construct the angle having the measures equals to each angle.

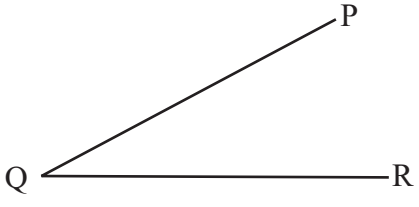
(a) 

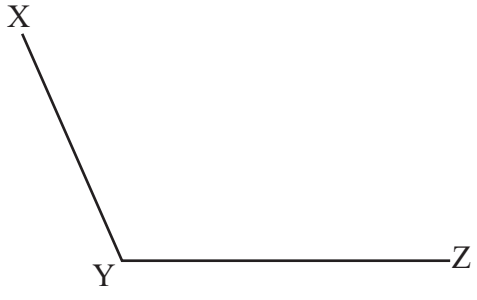
(b) 

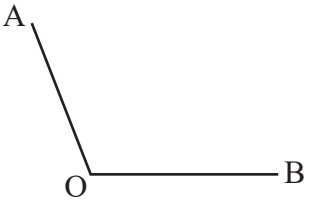
(c) 

5. Which angle is larger in the given pairs of angles? First estimate and confirm by measuring the angles using protractor.

(a) 

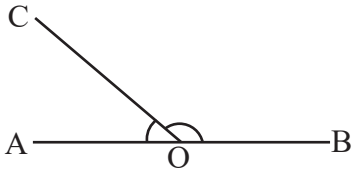


(b) 

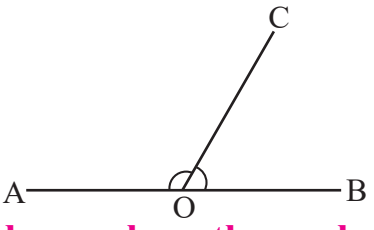


6. In each figure given below, write the measurement of ∠AOC and ∠BOC in degree.

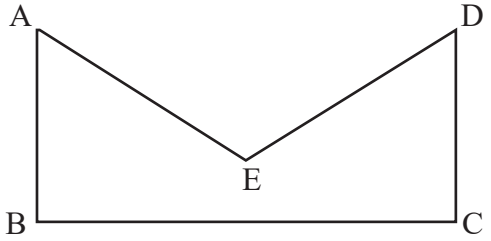
(a)



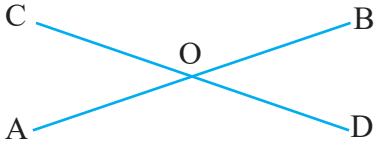
(b)

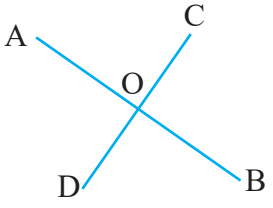


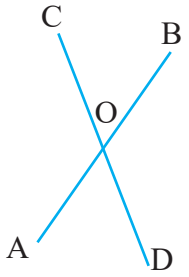
7. In the figure given below, find the places where the angle is formed and write the measure of each angle.



8. In the figure given below, measure the angles ∠AOC, ∠COB, ∠BOD and ∠DOA write their measurement in degree.







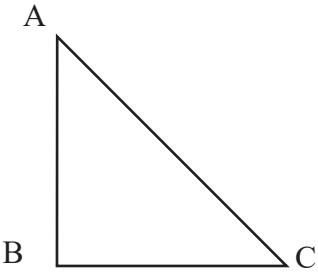
Project work

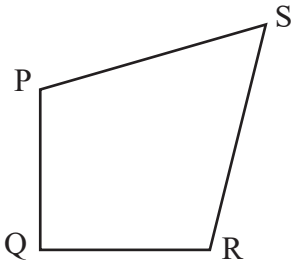
Stick a piece of thread on the chart paper and make angles. Then, measure the angles using protractor and present in the classroom.

1.2 Measurement of Angles of Triangle and Quadrilateral

Activity 5

Draw a triangle and a quadrilateral. Write the name of each angle in each figure. For example, in ΔABC the angles are ∠ABC, ∠BCA and ∠CAB. Similarly, in the quadrilateral PQRS, the angles are ∠PQR, ∠QRS, ∠PSR and ∠SPQ. Measure each angle by using protractor and present it in the classroom.



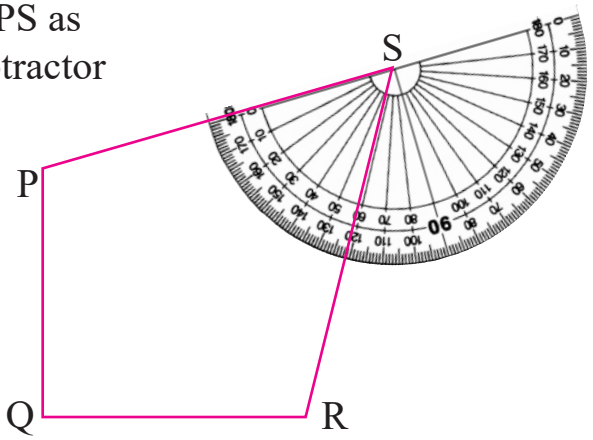


I can measure the ∠ABC, ∠BCA, ∠PQR and ∠QRS but how to measure ∠BAC, ∠QPS and ∠RSP?

Look everyone, I will show you by measuring them.

While measuring ∠RSP, take PS as the base line and place the protractor as shown in the figure. All of you tell me the measure of ∠RSP in degree.

So, ∠RSP = 60°. Similarly, measure the other angles using protractor.



Example 3

Measure the angles of the given triangle.

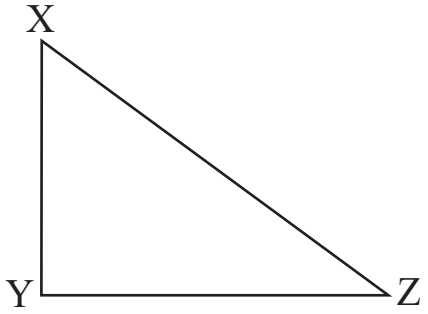
Solution

Here, when measured the angle by using a protractor, the following results are obtained.

∠XYZ = 90°

∠YZX = 36°, and

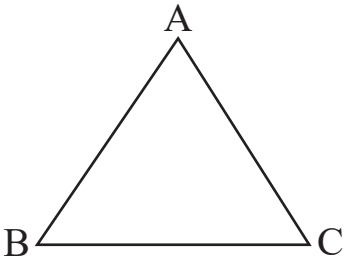
∠YXZ = 54°.



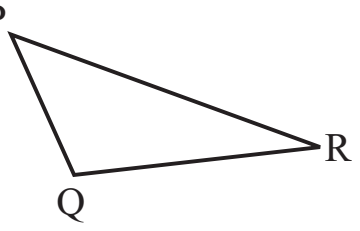
Exercisc 1.2

1. Measure all the interior angles of the triangles and quadrilaterals given below using a protractor.

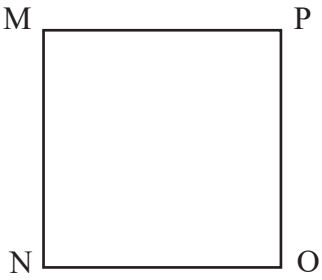
(a)



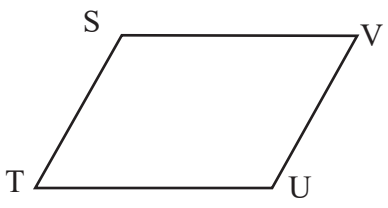
(b)



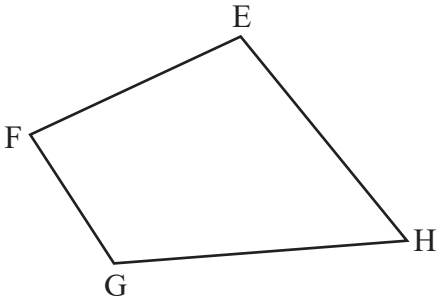
(c)



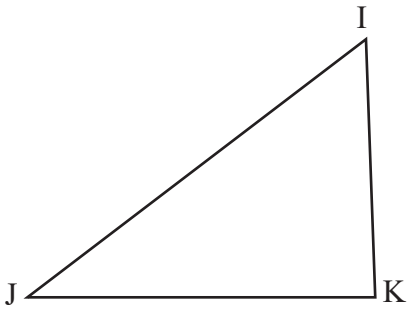
(d)



(e)

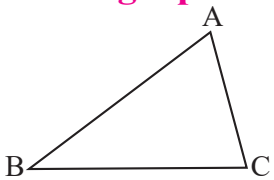


(f)

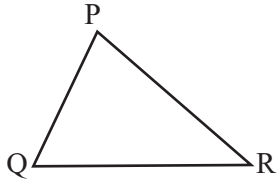


2. Find the measure of the interior angles of triangles given below using a protractor.

(a)



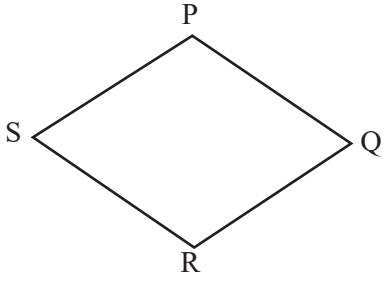
(b)



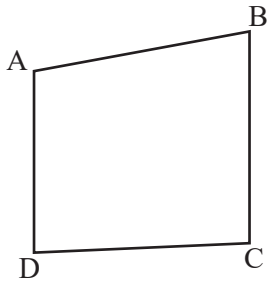
Find the sum of all the interior angles of both triangles.

3. Measure all the interior angles of the given quadrilaterals using a protractor and find out their sum.

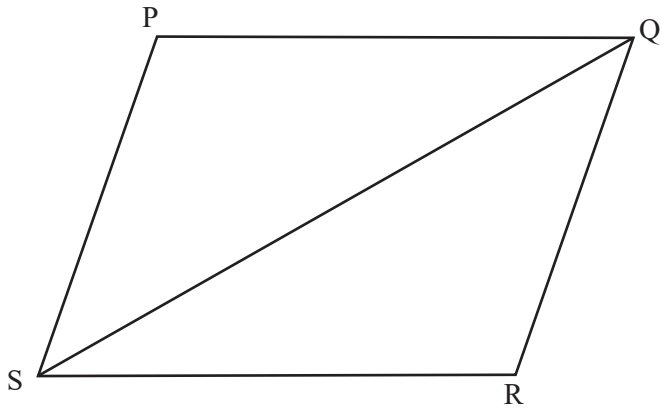
(a)



(b)



4. Given quadrilateral PQRS is formed by two triangles PQS and QSR.



(a) Find the measure of all the interior angles of the given quadrilateral.

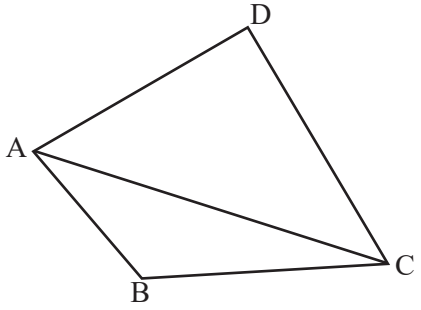
(b) Find the measure of all the interior angles of the triangle PQS.

(c) Find the measure of all the interior angles of the triangle QSR.

(d) What is the relation between the angles ∠PQS, ∠RQS and ∠PQR? Write it.

(e) What is the relation between the angles ∠PSR, ∠QSR and ∠PSE? Write it.

5. Given quadrilateral ABCD have two triangles ABC and ACD.



(a) Find the measurement of ∠ABC and ∠ADC using a protractor.

(b) Find the measurement of ∠CAB and ∠BCA using a protractor.

(c) Is ∠DAC +∠CAB = ∠DAB? Verify it by taking measurement using a protractor.

Project work

Collect 3 triangular and 3 quadrilateral objects found around you. Draw the surface pattern of those objects on chart paper and estimate the angle measurement of all the corners. Now, find actual measurement of those corners by using a protractor. Compare the estimated and actual measurement and present the result in the class.

1.3 Right Angle, Obtuse Angle and Acute Angle

Activity 6

Read the conversation given below:

Sabita: Guruma, we learned about the use of protractor of the geometry box. What is the name of the material that looks like a triangle? What is it used for?

Guruma: Sabita, you asked good question at the right time. Today, I will discuss with you about the names and uses of these materials. Geometry box contains two materials of triangular shape. Now, measure all the angles of these materials using a protractor.

Sabita: I measured, one angle is 90° and rest are both 45°.

Prabesh: In the ojbect I have measured, one angle is 90° and other two have 30° and 60° respectively.

Guruma: Yes, you are right. Both of these objects are called the set squares. Both objects have one angle 90° each. In one object, other two angles are both 45°. It is called set square of 45° and in the other, the rest of the angles are

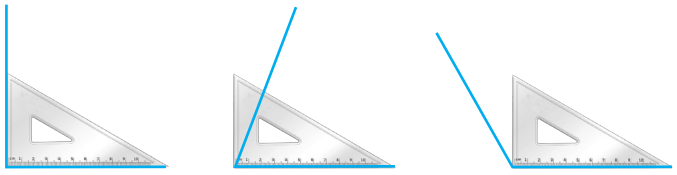
30° and 60° respectively. So, it is called the set square of 30° or 60°.

Dhaniya: Guruma, how do we use these objects in the lesson?

Guruma: Dhaniya, generally we use set squares to construct the perpendicular and parallel lines. But here, we will use them to distinguish whether an angle is 90° or greater than 90° or smaller than 90°.

Dhaniya: How, Guruma?

Guruma: Now, look at the instructional board. I will show you by using it.



Here, the first angle is equal to 90°. Similarly, the second angle is less than 90° and the third angle is greater than 90°.

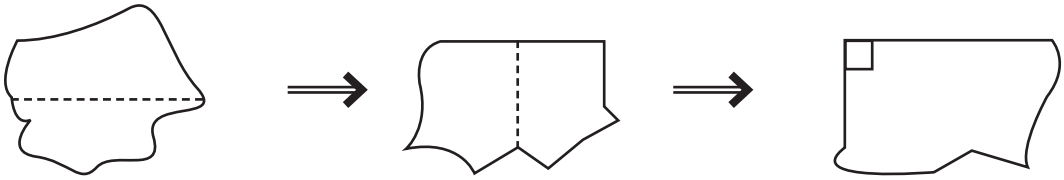
Sabita: Eh, How easy! Give us an angle. We will measure it by using them.

Guruma: Ok, everyone make an angle on your exercise book and give it to your nearby friend. Your friend will test whether the angle is equals to 90° or greater or smaller than 90°. I will observe your task.

(Everyone is busy on their work. After a while-)

Lakhan: Guruma! Is there any other material to test whether an angle is equal to or greater than or less than 90° without protractor and set square?

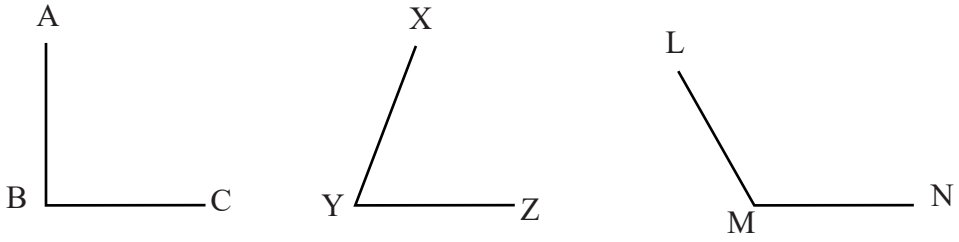
Guruma: Lakhan, you asked very good question. Yes, of course, we can find out whether an angle is equal to or greater than or smaller than 90° even by creating the materials ourselfes. If you remember, in class three, we made and used a material to measure the right angle. If you have forgotten, I will make it and show you right now.



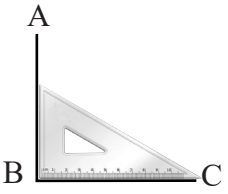
Lakhan: Ah! OK Guruma. It is possible to find out whether an angle is equal to or greater than or less than 90°, even it we don't have protractor or set square.

Activity 7

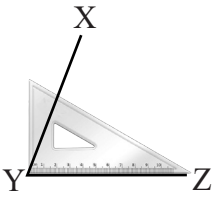
Identify the angles given below are exactly 90° or greater than 90° or less than 90° using a set square.



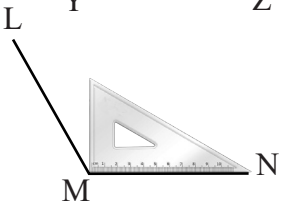
(a) As shown in the picture on the right, when the set square is placed properly, the measure of ∠ABC is 90°.



(b) Similarly, placing a set square on ∠XYZ, the measure of ∠XYZ is less than 90°.



(c) Placing the set square as shown in the figure, the measure of ∠LMN is greater than 90°.



The angles having the measures exactly 90°are called the right angles.

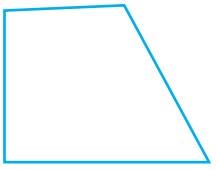
The angles having the measures less than 90° and greater than 0° are called the acute angles.

The angles having the measures greater than 90° and less than 180° are called obtuse angles.

In the above angles, ∠ABC is right angle, ∠XYZ is acute angle and ∠LMN is obtuse angle.

Activity 8

Sit in a groups with suitable numbers. Name the quadrilateral given below and answer the following questions by observing interior angles.



(a) How many angles are there in the given quadrilateral?

(b) Find the measure of each angle using a protractor.

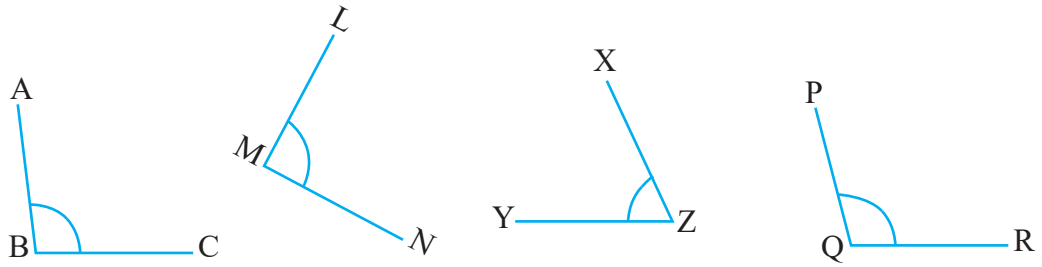
(c) How many right angles are there in the given quadrilateral?

(d) How many acute angles are there in the given quadrilateral?

(e) How many obtuse angles are there in the given quadrilateral?

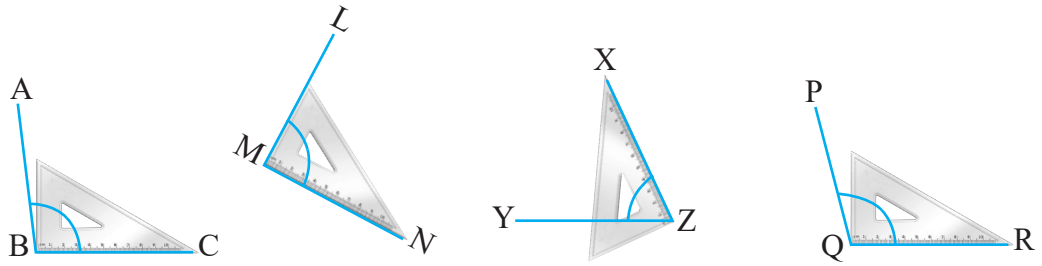
Example 4

Which of the angles in the given figure are right angles, acute angles or obtuse angles? Identify them.



Solution

By the help of set square,



$\angle ABC > 90°$, so $\angle ABC$ is obtuse angle

$\angle LMN = 90°$, so $\angle LMN$ is right angle.

$\angle XYZ < 90°$ so $\angle XYZ$ is acute angle.

$\angle PQR > 90°$, so $\angle PQR$ is obtuse angle.

By the help of a protractor,

$\angle ABC = 98°$, so $\angle ABC$ is obtuse angle

$\angle LMN = 90°$, so $\angle LMN$ is right angle.

$\angle XYZ = 65°$, so $\angle XYZ$ is acute angle.

$\angle PQR = 105°$, so $\angle PQR$ is obtuse angle.

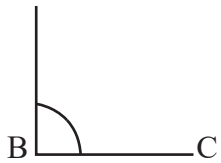
Exercise 1.3

1. Estimate the measurement of an angle formed in the picture given below and give a tick mark (√) in the suitable column of the table. Use protractor or set square to verify whether it is correct or not.

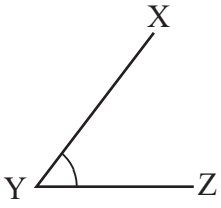
Angles	Right angle	Angle less than 90°	Angle greater than 90°
		√	
			
			
			
			

2. Which one of the following angles are right angles, acute angle or obtuse angle? Estimate it. Use a set square to test whether your estimation is correct or not.

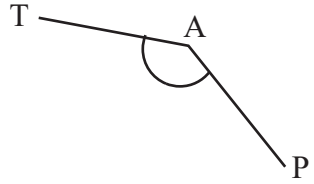
(a)



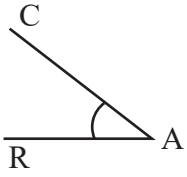
(b)



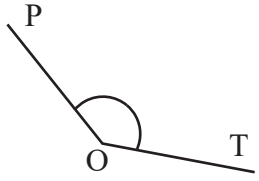
(c)



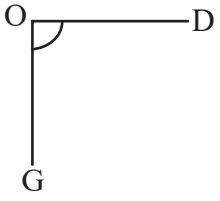
(d)



(e)



(f)



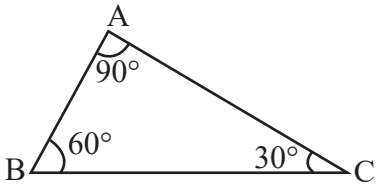
3. Classify the following angles and fill in the table.

125°, 25°, 45°, 90°, 75°, 135°, 150°, 165°, 105°

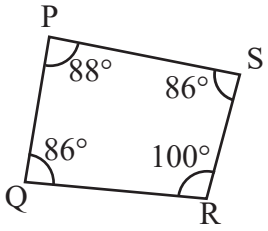
Acute angle	Right angle	Obtuse angle

4. Write the name of each angle in the figure given below and classify whether the angles are acute, right or obtuse.

(a)

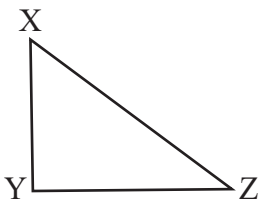


(b)

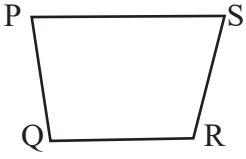


5. Measure all the interior angles of the triangles and quadrilaterals given below using a protractor and distinguish whether they are acute, right or obtuse angles.

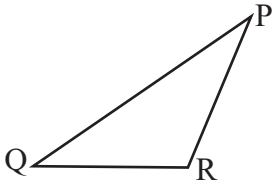
(a)



(b)

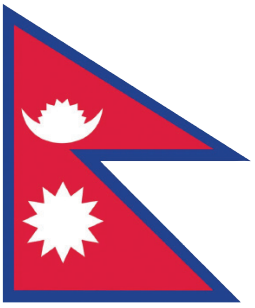


(c)



6. Where are angles formed in the letters of the English alphabet given below? Distinguish whether these angles are acute, right or obtuse angles.

7. A picture of the national flag of Nepal is given. Where are the angles formed in the flag? Distinguish whether they are right angles, acute angles or obtuse angle.



8. A photo of a Scarecrow is given below. Identify the places where angles are formed. Answer to the following questions.

(a) Where are acute angles formed?

(b) Where are obtuse angles formed?

(c) Where are right angles formed?

Project work

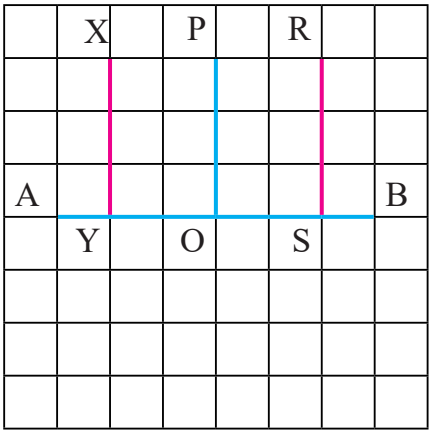
1. Make acute, right and obtuse angles by using sticks. Measure them using set squares and present in the classroom.
2. Draw a picture of a clock showing 2:00, 3:00, 6:00 and 7:40 on the chart paper. Classify the angles formed between the hour hand and minute hand at the above times. Decide whether the angles are right, acute or obtuse and present in the classroom.

1.4 Construction of Perpendicular Lines and Parallel Lines on Square Grid

(A) Perpendicular Lines

Activity 9

Take a square grid and draw the line segments AB, XY, PO and RS as shown in the figure. Observe the figure and discuss the questions given below:



(a) Estimate the measures of the angles ∠XYB, ∠POB and ∠RSB made by line segments XY, PO and RS with the line segment AB.

(b) Measure the angles using a protractor and test whether it is correct or not.

(c) How much degree angles are made by the vertical lines crossing the horizontal lines?

(d) Are all angles made by vertical lines with horizontal lines equal?

All the angles of the above square grid are equal. The angles ∠XYA, ∠XYB, ∠POB, ∠POA, ∠RSB and ∠RSA formed by the lines XY, PO and RS on the line AB have equal measure, i.e. 90°. All angles formed by vertical lines with horizontal lines are 90° and so, they are all equal. Two straight lines that make 90° at the point of intersection to each other are called perpendicular lines.

Two lines that make an angle of 90° to each other are called the perpendicular lines. In the above figure, XY, PO and RS are perpendicular with AB. It can be written as XY⊥ AB, PO ⊥ AB and RS ⊥AB.

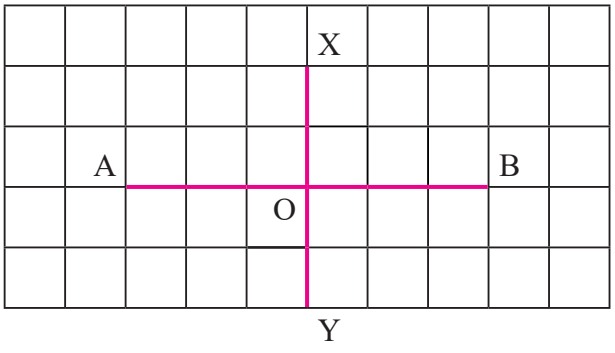
In a square grid, all the vertical and horizontal lines are perpendicular to each other.

Example 1

Draw a line segment AB on square grid and also draw a line segment XY which is perpendicular with AB.

Solution

Here,

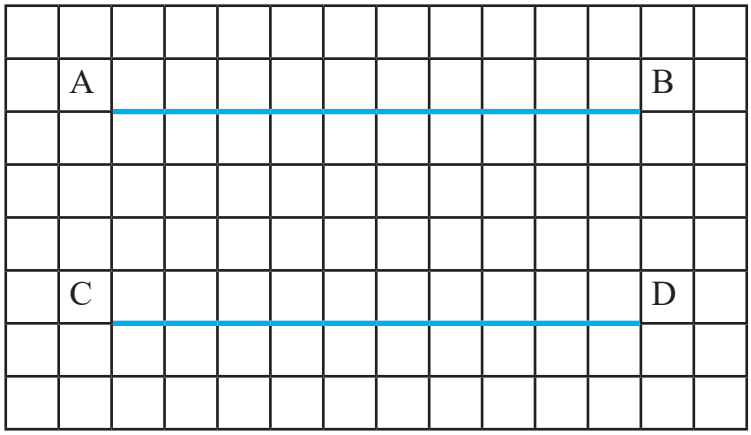


In the figure, XY and AB are intersected at an angle 90°. Therefore, they are perpendicular to each other i.e. XY ⊥ AB

(B) Parallel Lines

Activity 10

Sit in a groups with suitable number. Take a paper of square grid by each group. Draw straight lines AB and CD on the square grid paper as shown in the figure.



Now, discuss based on the questions given below:

(a) How many squares are there from A to C?

(b) How many squares are there from B to D?

(c) Are there the same number of squares?

(d) What kind of lines are called the above lines?

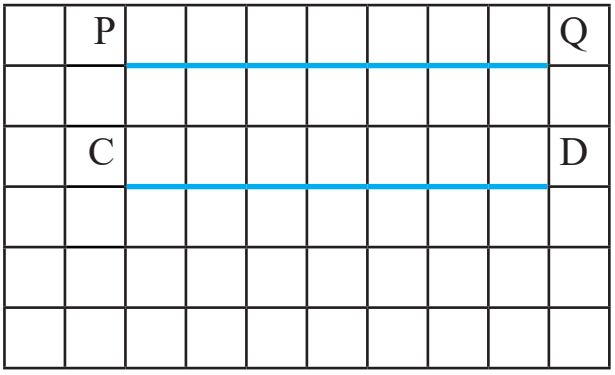
There are four squares from A to C. Similarly, there are four squares from B to D. The distance from A to C and from B to D are equal. In such condition, the lines AB and CD are parallel to each other. This is denoted by AB // CD.

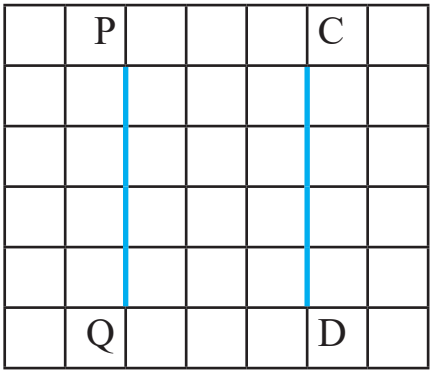
If the distance between the two straight lines on the plane surface is always the same, then those lines are called parallel lines. Horizontal lines in the square grid are parallel to each other. Similarly, vertical lines in the square grid are parallel to each other.

Example 2

Construct CD parallel to PQ on the square grid.

Solution





In the figure, the lines PQ and CD are parallel.

Exercise 1.4

1. Fill in the blanks with appropriate words.

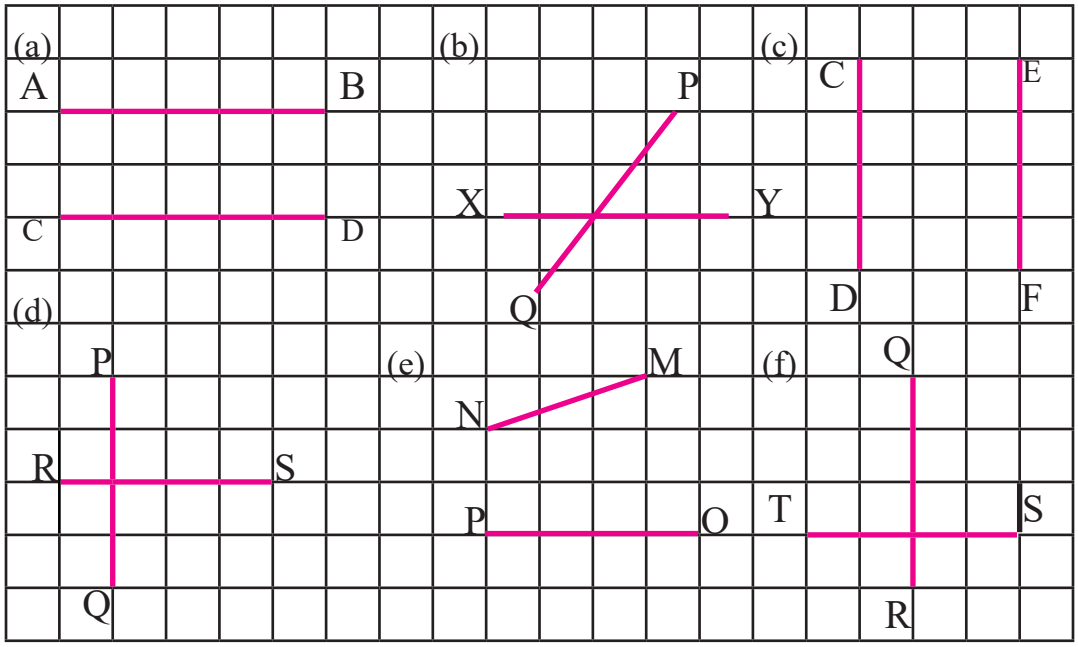
(a) Distance between the two parallel lines is always ……..

(b) Two parallel lin,es if extended from both sides, they do not …… each other.

(c) Lines that intersect at right angles to each other are called …… lines.

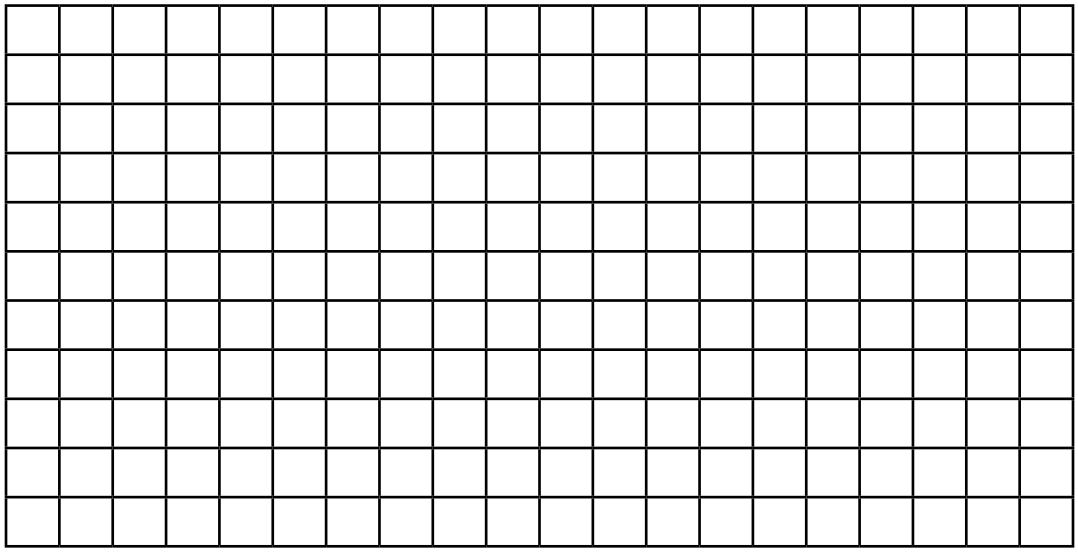
(d) The measure of the angle formed at the point of intersection of two intersecting lines perpendicular to each other is …… degree.

2. Look at the picture below and find the perpendicular and parallel lines.



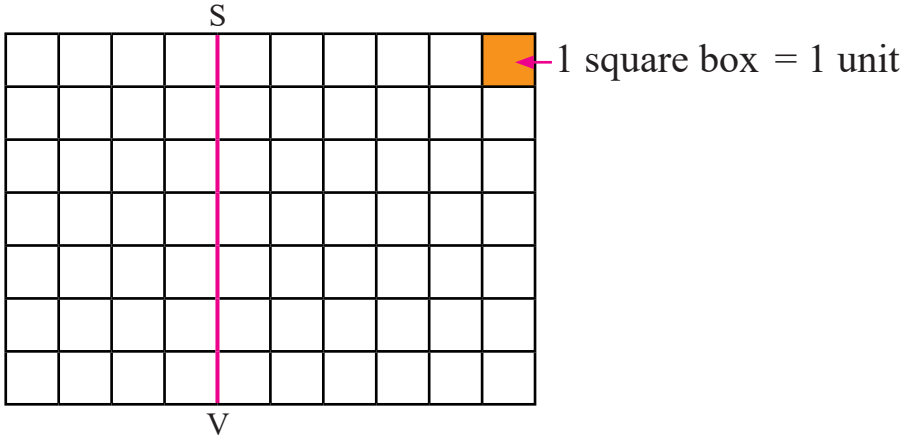
3. Draw a following parallel and perpendicular lines on the square grid given below.

(a) AB ⊥ CD (b) RX ⊥ HD (c) (PQ || AB) (d) (XY || ST)



4. Draw lines parallel to the given lines

(a) Draw lines on two units left and two units right which are parallel to the line SV.



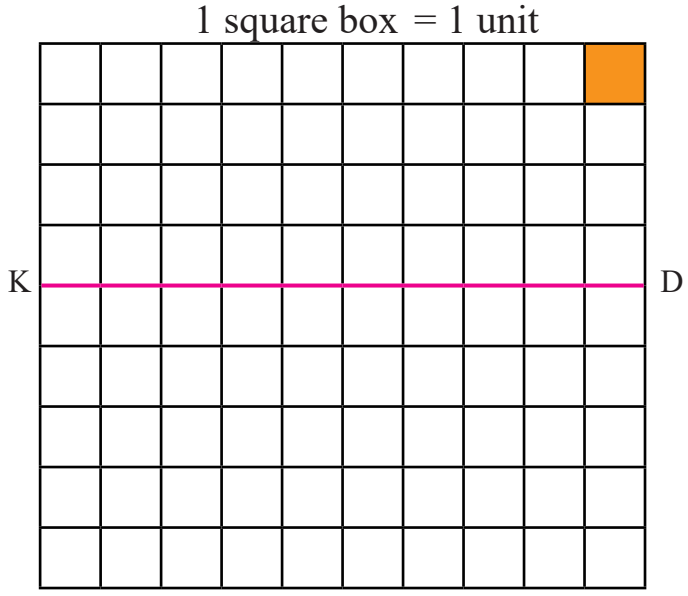
(b) Having parallel to the line KD:

(i) Draw a line 2 units above it

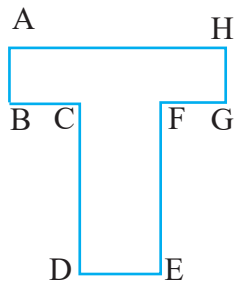
(ii) Draw a line 3 units above it

(iii) Draw a line 2 units below it

(iv) Draw a line 4 units below it



5. Write the letter of the English alphabet on square grid paper. As shown in the picture, write the pair of parallel and perpendicular lines.



Project work

Observe the doors and windows of your classroom or house and identify the parallel and perpendicular conditions and note them. Present them with picture in the classroom.

Lesson 2

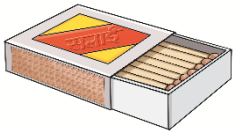
Solid Objects

2.0 Review

Observe the following solid objects. What types of objects are they? What are they used for? Identify their surfaces, edges and vertices.

(a) 

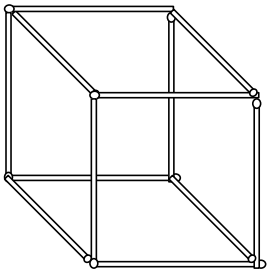
(b) 

(c) 

(d) 

2.1 Faces, Edges and Vertices of Solid Objects

Activity 1



Form a group of students with appropriate number. Each group takes a hollow model (khokro namuna) of cube made of juice pipe wheat straw. Observe the hollow model and discuss the following question. Then, find the answer.

(a) How many juice pipes or wheat straw are used in the model of the cube?

(b) How many places are the pipes connected?

Activity 2

Sit in groups of appropriate number. Take a matchbox by each group. Observe the matchbox, discuss the following questions and make a conclusion.

(a) How many closed plane figures are there in the given object made up of four straight edges? What is it called?

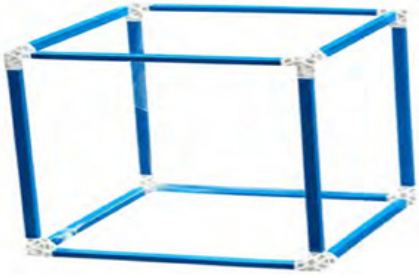
(b) How many corners are formed by three straight edges? What are they called?

(c) What is the part made by two plane surface while they are intersecting each other? How many such parts are there?

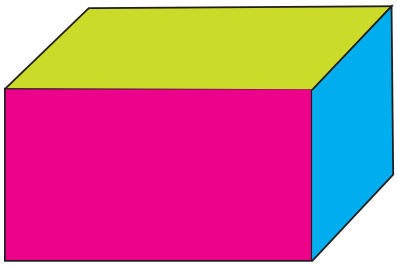
(d) Tell the answers of all these questions to your teacher.

Activity 3

Make groups of students with appropriate number. With the help of the teacher, each group constructs a hollow model of cuboid (khokro namuna) from juice pipe or wheat straw or sticks as shown in the figure. Stick papers of different colors on the surface of the cuboid to distinguish the surfaces. Now, observe the cuboid, discuss in the group and find answers to these questions.



hollow model of cuboid



cuboid with colorful paper

(a) How many straight edges are there on the cuboid made above joining two different color papers?

(b) How many vertices are there on the cuboid in which three different color paper are attached? Calculate and show it to the teacher?

(c) How many plane surfaces are there with different color?

(d) How many juice pipes or wheat straws or sticks were used while constructing the above model of cuboid? Which parts of the cuboid were made by them? Discuss.

(e) If we construct a cube in the same way as cuboid, does it also have the same number of surfaces, edges and vertices as a cuboid? Discuss.

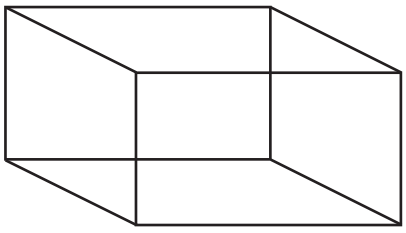
- In the cuboid, there are 6 faces, 12 edges and 8 vertices or corner.
- A cube also has 6 faces, 12 edges and 8 vertices or points.

Thoughtful Question: Are cube and cuboids the same thing?

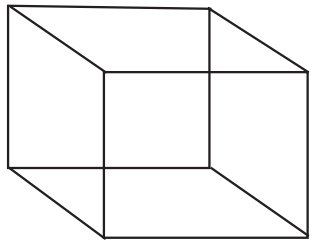
Example 1

The given geometrical figures are solid objects. What shapes are the figures? Write the number of surfaces, edges and vertices of each shapes.

(a)



(b)



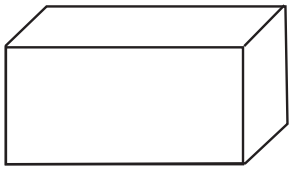
Solution

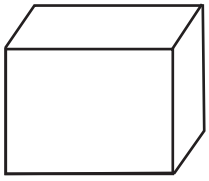
(a) This is a cuboid. It has 6 faces, 12 edges and 8 vertices.

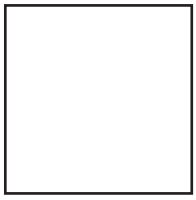
(b) This is a cube. It has 6 faces, 12 edges and 8 vertices.

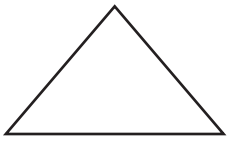
Exercise 2.1

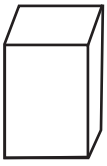
1. Which one of the following geometrical shapes are solid objects?

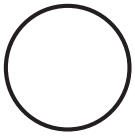
(a) 

(b) 

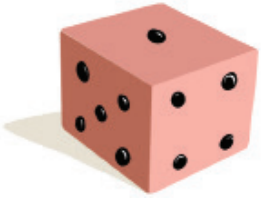
(c) 

(d) 

(e) 

(f) 

2. How many surfaces, edges and vertices are there in the following solid figures?



3. Write appropriate words in the blanks.

a) A cube has total ……. number of squared faces.

b) A cube has total ……. number of edges.

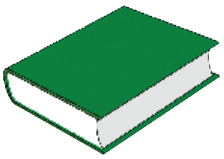
c) A cuboid has total ……. number of rectangular surfaces.

d) A cuboid has total ……. number of edges and …… number of vertices.

e) A dice of langur burja has total…….. number of vertices.

4. Separate the cube and cuboid from the solid objects given below:

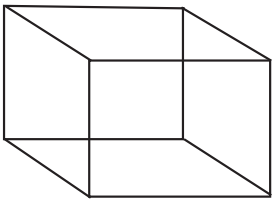
(a) 

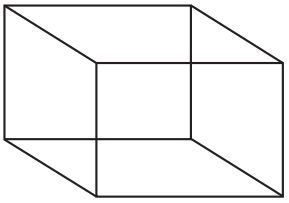
(b) 

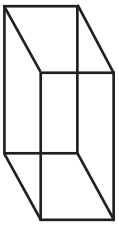
(c) 

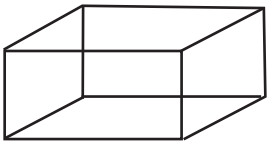
(d) 

5. Write the number of surfaces, edges and vertices of each solid object given below:

(a) 

(b) 

(c) 

(d) 

6. Write the number of surfaces, edges and vertices of each solid object given below:

(a)

(b)

(c)

7. Count the surfaces, edges and vertices of your mathematics textbook and write their number.

Project work

1. Collect the solid object around you such as cube and cuboid, and write the number of their vertices, edges and surfaces and present them in the class

S.N.	Name of the object	Number of edges	Number of vertices	Number of surfaces

2. Construct a model of a cube and cuboid using chart paper and present them in the classroom.
3. Construct the khokro model of cube and cuboid using stick, juice pipe or wheat straw and present it in the classroom

Mixed Exercise

1. Draw five angles of different measures using a protractor.

(a) Write the measurement of the angles.

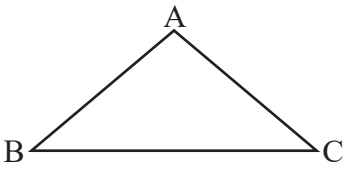
(b) Differentiate which one of them are right angle, acute angle or obtuse angles.

2. A triangle and quadrilateral are given below.

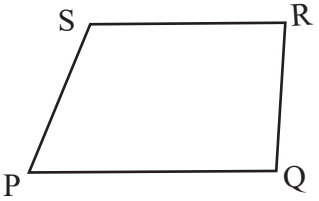
(a) Measure all the interior angles using a protractor.

(b) Differentiate which one of them are right angle, acute angle or obtuse angles.

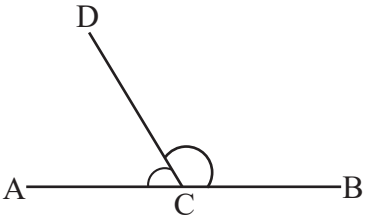
(a)



(b)



3. Observe the picture and answer of the questions given below:

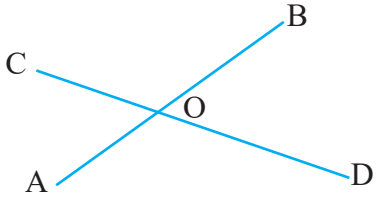


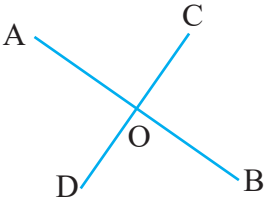
(a) Write the measure of ∠ACD, ∠BCD and ∠ACB.

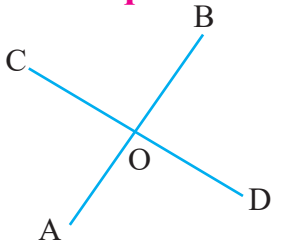
(b) Find the sum of ∠ACD and ∠BCD.

(c) What type of relation are there between ∠ACD, ∠BCD and ∠ACB? Write it.

4. Look at the pictures given below and answer the questions that follow.





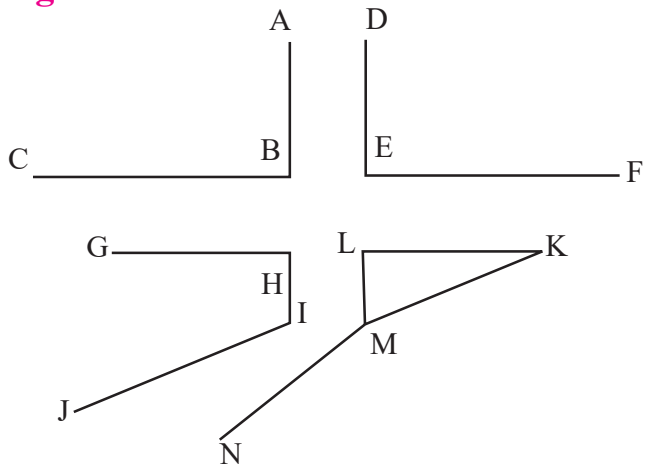


(a) Measure the angles ∠AOC, ∠COB, ∠BOD and ∠DOA using a protractor.

(b) Which one of them are right angles, acute angles or obtuse angles? Write it.

(c) What type of relation is there between ∠AOC and ∠BOD in all the figures?

5. The following figure shows a sample of a crossroad. Different angles are made there.

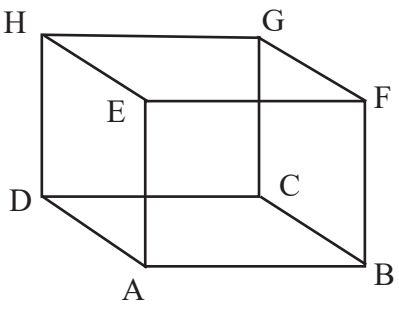


(a) Which angles are acute angles? List them.

(b) Which angles are right angles? List them.

(c) How many obtuse angles can be seen in the picture? Write their names.

6. Observe the given figure of a cuboid and answer the following questions:



(a) What is the number of faces, edges and vertices?

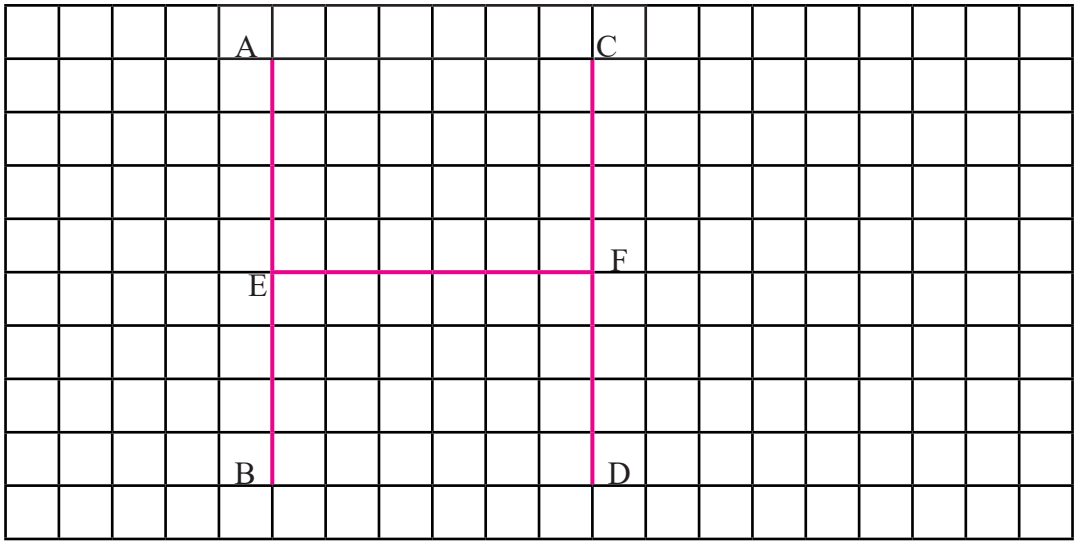
(b) Write the two pairs of surfaces which are equal to each other.

7. English letter H is placed in the following square grid

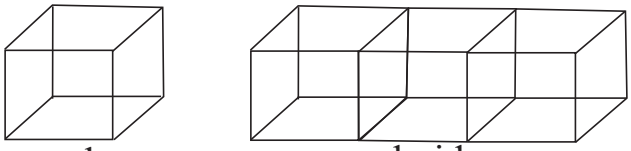
(a) Write the names of the parallel lines.

(b) Which lines are perpendicular to the line EF?

(c) Write the relation between EF and AB and also FE and CD.



8. The given figures show a model of cube and a cuboid made up of three cubes.



(a) Write the numbers of the surfaces in the cube and cuboid.

(b) Is there equal number of edges in both the cube and cuboid?

(c) Are the surfaces of cube and cuboid equal to each other? Write with reason.

Lesson 3

Number Sense

3.0 Review

Study the following table and discuss the answer to the following questions.

Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
1	2	3	4	5	6	7

a) How many lakhs are there in total?

b) How many thousands are in total?

c) How many hundreds are in total?

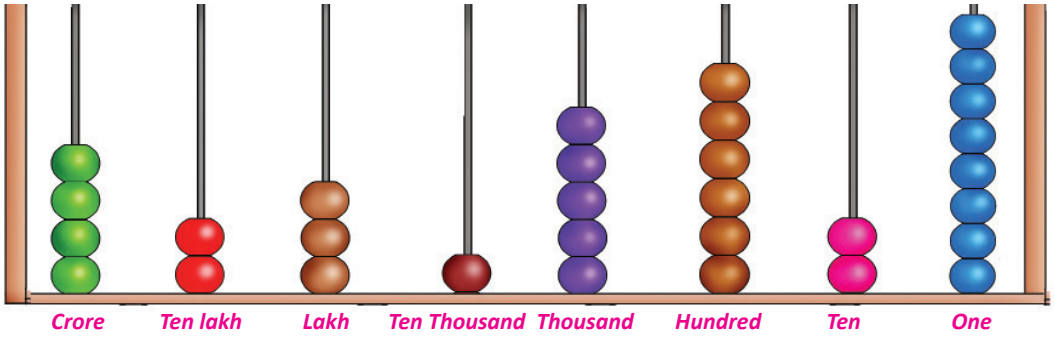
d) How can we write or read the above numbers?

3.1 Numbers upto Nine Digit Numbers in National System

Activity 1

Look at the given abacus and fill the digits in the place value table.

Crore	Ten lakh	Lakh	Ten Thousand	Thousand	Hundred	Ten	One



In the given abacus, there is 8 ones, 2 tens, 6 hundreds, 5 thousand, 1 ten thousand, 3 lakhs, 2 ten lakhs and 4 crores. All of them can be presented in place value table as given below:

Crore	Ten lakh	Lakh	Ten Thousand	Thousand	Hundred	Ten	One
4	2	3	1	5	6	2	8

In Number: 4,23,15,628

In letters: Four crore twenty three lakh fifteen thousand six hundred and twenty-eight.

Activity 2

Study the table given below and answer these questions.

Ten crore	Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
9	2	8	6	7	3	4	1	5

(a) How many crores are in total?

(b) How many lakhs are in total?

(c) How many thousands are in total?

(d) How many hundreds are in total?

(e) What is the number formed by last two digits?

(f) How can we write or read the above number according to national system?

The given number can be written as 92,86,73,415 and it can be read as ninety two crore eighty six lakh seventy three thousand four hundred fifteen. (देवनागरीमा बयानब्बे करोड छयासी लाख त्रिहत्तर हजार चार सय पन्ध्र)

What is the face value and place value of the digits which are circled in the number 9 ②8 ⑥⑦3,41 ⑤. Discuss it. Which are the circled digits whose face value and place value are the same?

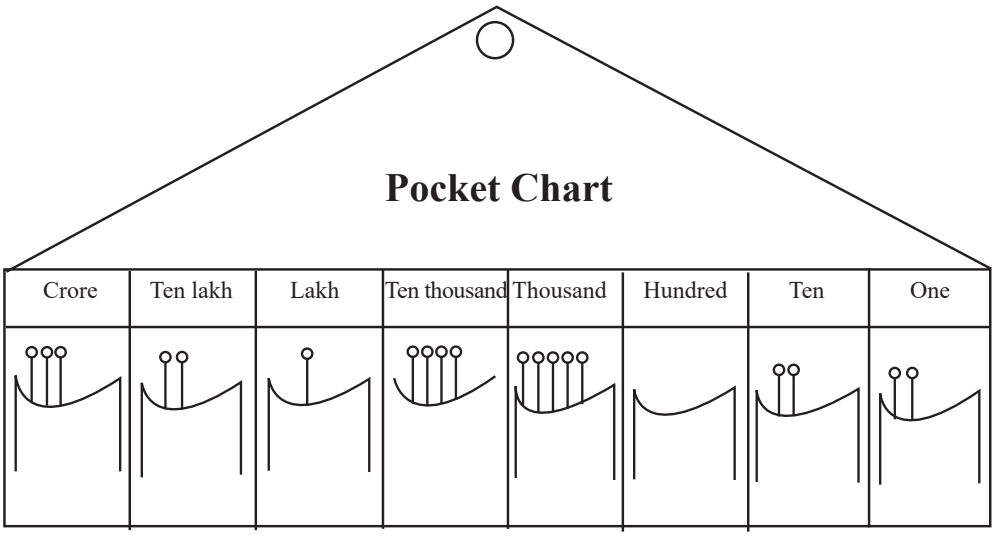
Here,

Digits	Face Value	Place Value
2	2	2 crore = 2 × 1,00,00,000 = 2,00,00,000
6	6	6 lakh = 6 × 1,00,000 = 6,00,000
7	7	7 ten thousand = 7 × 10,000 = 70,000
5	5	5 one = 5 × 1 = 5

Thus, 5 has the same place value and face value.

Activity 3

Take 9 pieces of sitcks (sinka) each. Hang the pocket chart on the wall so that everyone can see it.



After that, everyone has to put some sticks on each pocket. Present the number denoted by the sticks of the pocket chart in the place value table and discuss on the basis of following questions:

(a) How many sticks are there in the place of crore?

(b) What is the value represented by the stick in the crore place?

(c) Write the numbers represented by all the sticks in the pocket chart.

Example 1

Present the number 8,14,23,576 in the place value table and write the face value and place value of digit 8.

Solution

Here, presenting the number 8,14,23,576 into place value table:

Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
8	1	4	2	3	5	7	6

The face value of 8 = 8

The place value of 8 = 8 crore = 8 × 1,00,00,000 = 8,00,00,000

Example 2

Present the number 98, 41, 32, 657 in the place value table and write the face value and place value of digit 9.

Solution

Here, presenting the number 98, 41, 32, 657 into place value table:

Ten crore	Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
9	8	4	1	3	2	6	5	7

The face value 9 = 9

The place value of 9 = 9 ten crore = 9 × 10,00,00,000 = 90,00,00,000

Activity 4

All the students sit in a group with appropriate numbers. Take the digit chart consisting of the Devanagari digits (०, १, २, ३, ४, ५, ६, ७, ८, ९). Using these digits, form of number consisting the nine digits, for example: ३४१६९५८२७. Put the number in the place value table and write them in words.

दश करोड	करोड	दश लाख	लाख	दश हजार	हजार	सय	दश	एक

Example 3

An industry has produced 20139845 toys in a year. Present it in a place value table and write the numbers in Devanagari digits and words.

Solution

Presenting above numbers in place value table:

दश करोड	करोड	दश लाख	लाख	दश हजार	हजार	सय	दश	एक
२	०	१	७	३	९	८	४	५

In words: twenty crore seventeen lakh thirty-nine thousand eight hundred forty-five.

Example 4

According to the census of 2068 in Nepal, the total number of youth is one crore eight lakh sixty-nine thousand eight hundred forty-two. Write the given number in Devanagari number using comma (,).

Solution

Here, number of youth = १ करोड ८ लखा ६९ हजार ८ सय hundred forty two

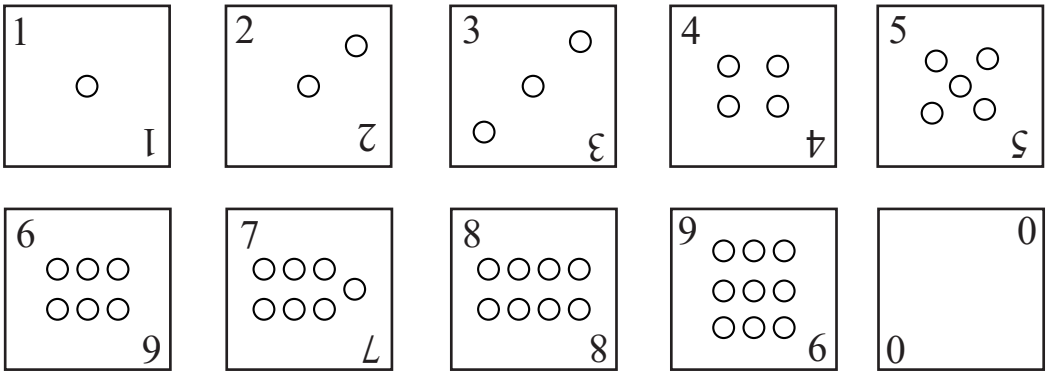
करोड	दश लाख	लाख	दश हजार	हजार	सय	दश	एक
१	०	८	६	९	८	४	२

Writing the number using comma = १,०८,६९,८४२

Expanded Form

Activity 5

Construct a number card having the digits 0,1,2,3,4,5,6,7,8,9 as shown in the figure given below:



Shuffle all the card well and ask your friend to take eight digits from it. Discuss about the numbers that can be formed by these eight digits and write them in expanded form as given below:

Suppose one number can be 18234567. Now, writing it in its expanded form as:

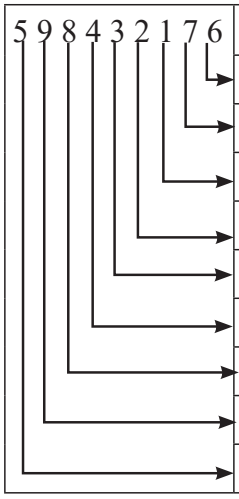
1,82,34,567 = 1 ×1,00,00,000 + 8 × 10,00,000 + 2 × 1,00,000 + 3 × 10,000 + 4 × 1,000 + 5 × 100 + 6 × 10 + 7 × 1

Example 5

Write the number 598432176 into expanded form.

Solution

Here, finding the place value of the given number,



place	place value
Ones	6 × 1 = 6
Tens	7 × 10 = 70
Hundreds	1 × 100 = 100
Thousands	2 × 1000 = 2000
Ten Thousands	3 × 10000 = 30000
Lakhs	4 × 100000 = 400000
Ten Lakhs	8 × 1000000 = 8000000
Crore	9 × 10000000 = 90000000
Ten Crores	5 × 100000000 = 500000000

Now, writing it in expanded form,

59,84,32,176 = 5 × 10,00,00,000 + 9 ×1,00,00,000 + 8 × 10,00,000 + 4 × 1,00,000 + 3 × 10,000 + 2 × 1,000 + 1 × 100 + 7 × 10 + 6 × 1

Exercise 3.1

1. Present each number given below in the place value table.

(a) 1,30,21,623 (b) 2,45,03,214

(c) 4,35,26,041 (d) 6,03,49,815

(e) 48,69,45,307 (f) 79,45,32,681

2. Fill in the blanks.

(a) The face value of 7 in the number 7, 25, 43,268 is …….

(b) The place value of 6 in the number 56, 23, 78, 594 is …….

(c) In the number 5,42,16,783 the digit in the crore place is…..

(d) In the number 1,80,43,215 the digit in the crore place is ….

3. Fill in the blanks

(a) In the number 2,34,56,971 there is ……. crore in total.

(b) In the number 3,01,45,692 there is ……. crore in total.

(c) In the number 15,00,74,693 there is/are …. crore in total.

(d) In the number 43,69,08,452 there is/are …. crore in total.

4. In the number below, write the place value of the digits in the place of crore and ten crores.

(a) 3,47,56,129 (b) 5,67,84,240

(c) 6,48,01,205 (d) 8,49,65,308

(e) 59,01,23,874 (f) 79,15,46,193

5. Write the place value of the circled digits in the numbers given below.

(a) ②,34,58,691 (b) ⑤,84,20,193

(c) 18,③2,40,587 (d) 8 ⑥,52,49,870

(e) 93,①5,34,253 (f) 3④,10,87,126

6. Write the following numbers using commas (,).

(a) 14240536 (b) 231460908 (c) 402014683

(d) 732004215 (e) 690456711 (f) 942540000

7. Write the following numbers into digits using commas

(a) One crore fifteen lakh six thousand three hundred fourteen

(b) Eighteen crore twenty four lakh five thousand three hundred

(c) Two crore three lakh fifteen thousand thirteen

(d) Three crore twenty nine lakh eleven thousand one hundred twenty five

(e) Twenty crore twenty lakh fifty-five thousand two

(f) Eighty crore one lakh three thousand two hundred thirty

g) Fifteen crore thirty-five lakh sixty three thousand five

8. Write each of the following numbers into expanded form.

(a) 1,86,43,215 =

(b) 2,54,38,287 =

(c) 35,40,69,481 =

(d) 96,75,48,231 =

(e) 78,49,65,102 =

9. Write the following expanded form of the numbers into short form.

(a) 2 ×1,00,00,000 + 3 × 10,00,000 + 1 × 1,00,000 + 5 × 10,000 + 4 × 1,000 + 6 × 100 + 8 × 10 + 9× 1 =

(b) 5 ×1,00,00,000 + 2 × 10,00,000 + 8 × 1,00,000 + 4 × 10,000 + 9 × 1,000 + 7 × 100 + 3 × 10 + 6 × 1

(c) 7 ×1,00,00,000 + 1 × 10,00,000 + 4 × 1,00,000 + 2 × 10,000 + 7 × 1,000 + 5 × 100 + 8 × 10 + 3 × 1

(d) 8 ×1,00,00,000 + 2 × 10,00,000 + 5 × 1,00,000 + 1 × 10,000 + 4 × 1,000 + 2 × 10 + 7 × 1

10. Write the following numbers into words of Nepali and English.

(a) 1,13,45,021 (b) 2,45,60,436

(c) 14,69,84,527 (d) 67,40,30,500

(e) 19,84,32,356 (f) 20,99,05,006

(g) १,४५,२३,६०७ (h) २३,००,१८,९५३

(i) ५०,६९,४२,५३६ (j) ६९,३४,०१,६९५

11. Total population of Nepal according to the preliminary report of National Census 2078 B.S. is 2,91,92,480.

(a) Present the number of population into place value table.

(b) Write the place value of the digit in the place of crore.

(c) Write the given numbers into expanded form.

12. Total population of female according to the preliminary report of National Census 2078 B.S. is 1,49,01,169.

(a) Write the above number in words.

(b) Present the number into place value table.

(c) Write the place value of the digits in the place of ten lakh.

(d) Write the face value and place value of 4 in the above number and differentiate them.

(e) Write the above number into expanded form.

13. The total area of Nepal is 147181 square kilometer.

a) Write the number of area using comma and in words also.

b) Present given number into place value table and write in English number.

14. Total population of Nepal in 2068 B.S. was 2,31,51,423.

(a) Present the numbers representing the given population into place value table.

(b) Write the place value of the digits in the place of ten lakh.

(c) Write the above number into expanded form.

(d) Write the face value and place value of 4.

(e) Write the population of Nepal in the words of both Nepali and English languages.

(f) If the population of Nepal is increased by 40,580 in one year, how much will it be in the next year? Write in words.

Project work

Ask your parents or teachers about the total budget received in one financial year of your municipality. Show the amount in the place value table according to the national system and present in your classroom.

3.2 Numbers upto Nine Digit Numbers in International System

Activity 6

Study the following table and discuss the questions given below.

Period	Millions			Thousands			Units		
Place Name	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
Number	3	5	8	4	1	7	6	9	2

(a) How many millions are there in total?

(b) How many thousands are there in total ?

(c) How many parts is each period divided into?

(d) How can we to put a comma in the number 358417692 mentioned in the above table?

(e) How can we write or read the above number?

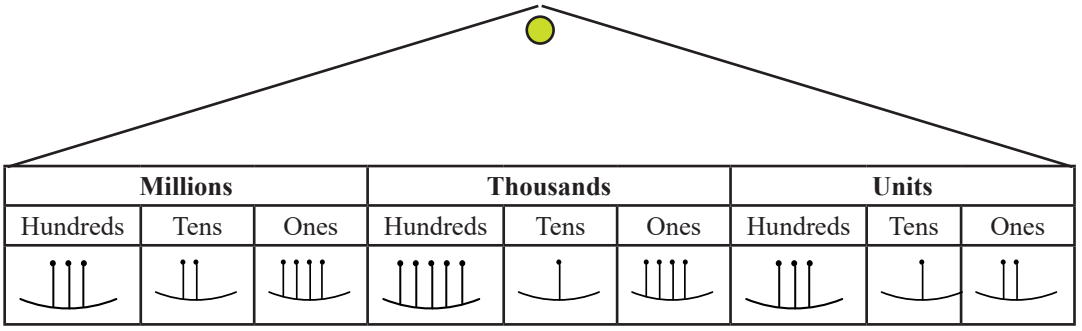
The conclusion from discussion is:

Each period is divided into three parts. In international system of writing numbers, the comma is placed at the difference of 3 digits each from the right hand side. Accordingly, the given numbers can be written using commas as 358,417,692.

It can be read as 358 million 417 thousand and 692. It can be written in words as: three hundred fifty-eight million four hundred seventeen thousand and six hundred ninety-two.

Activity 7

Fill in the digits in the place value table by counting the sticks given in the pocket chart.



Millions			Thousands			Units		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones

Place value table

Periods	Millions			Thousands			Units		
Place name	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
Number									

In digits: .....

In words: .....

3.3 Comparison between national and international number system

Activity 8

According to the preliminary report of the national census 2078 B.S., the total population of Nepal is 2,91,92,480. But, how do you read it? The number is huge. Hari looks confused. At the same time, his friend Milan suddenly came. Now, let's read the conversation between them.

Hari: How can I read the population of Nepal 2,91,92,480? I am worried.

Milan: Um! It can be read as two crore ninety-one lakh ninety

-two thousand four hundred and eighty.

Hari: I think, the teacher said millions… or something like that, isn't it?

At the same moment, Binita arrives.

Binita: What's going on guys?

Hari: How should we read the total population of Nepal? We didn't even read it. Do you know?

Binita: Yes, it can be read in two ways.

Milan: Okay then tell us the ways. How should we read using these ways?

Binita: OK listen. There are two systems of reading and writing a number. They are national and international. According to national system, the total population can be read as two crore ninety-one lakh ninety-two thousand and four hundred eighty. Similarly, according to international system it can be read as twenty nine millions one hundred ninety two thousands and four hundred eighty.

Hari: Milan also told it correctly according to the national system. But, I forgot the international system. Binita, after you said it again, I feel refreshed.

Milan: What are the differences between the two systems? Do you know, Binita?

Binita: Listen to me! So far I know, there is no period in national system but there is period in international system. In national system of writing number, the first commas is placed before 3 digits from right to left and after that in the difference of 2 digits each. In international system, commas are placed in before every 3 digits from right to left.

Hari: If so, the way of reading them can be another difference between them. Isn't it Binita?

Binita: Yes, of course. You are right Hari.

Milan: OK, today we can understand the differences between the national and international system of writing the numbers. Bye for today.

Example 5

Present the number 714,321,576 in the place value table according to international system and write the number in words.

Salution

Presenting the number 714,321,576 in the place value table according to international system

Millions			Thousands			Units		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
7	1	4	3	2	1	5	7	6

In words: 714 million 321 thousand and 576 (seven hundred fourteen million three hundred twenty-one thousand and five hundred seventy-six)

Example 6

Write the number 82431675 into national and international system using commas (,) and also write in words

Solution

Here, according to national system: 8,24,31,675

In words: eight crore twenty four lakh thirty one thousand and six hundred seventy-five

According to international system: 82,431,675

In words: eighty-two million four hundred thirty-one thousand and six hundred seventy-five

Example 7

Write the following numbers in digits using commas.

Five hundred six million two hundred sixty-two thousand and one hundred twenty-one.

Solution

506,262,121

Exercise 3.2

1. Write the following numbers according to international system using comma (,).

(a) 14302517 (b) 250634101

(c) 730456120 (d) 805040931

(e) 904406751 (f) 999000009

2. Fill in the blanks

(a) Number 1435687 has ……. millions in total.

(b) Number 3614890 has ……. millions in total.

(c) Number 45090403 has ……. millions in total.

(d) Number 29100000 has ……. millions in total.

3. Write the following numbers into digits.

(a) Five million three hundred twenty two thousand and eight hundred ten

(b) Eight million six thousand and four hundred twenty-seven

(c) Nineteen million seven hundred one thousand and four hundred seventy-five

(d) Seventeen million one hundred eighty-six thousand and two hundred two

(e) Two hundred fifty-seven million four hundred twenty thousand and three

4. Present the following numbers into place value table and write in words according to international system.

(a) 16,754,321 (b) 28,103,438

(c) 244,132,567 (d) 135,000,281

(e) 149,280,694 (f) 234,021,645

5. According to the preliminary report of the national census 2078 B.S., the total population of Nepal is 2,91,92,480. Among them 1,42,91,311 are males and 1,49,01,169 are females. Present the above numbers into following place value tables.

(a) According to national system

(b) According to international system

(c) Write the above numbers in words according to national system using commas.

(d) Write the above numbers in words according to international system using comma.

6. In maximum, how many digits number is the use of commas according to national and international systems the same? Write with examples.

7. The price of a house in Kathmandu is two crore ten lakh sixty thousand and five hundred. Write the above price:

(a) In digits according to national system using commas.

(b) In digits according to international system using commas.

(c) Write in words according to international system.

8. The price of a new car that has just arrived in the market is forty lakh fifteen thousand and seven hundred thirty. Write the price

(a) In digits according to national system using commas.

(b) In digits according to international system using commas

(c) In words according to international system.

9. Write the greatest number formed by nine digits:

(a) Present the number in place value table according to national system.

(b) Present the number in place value table according to international system.

10. The number in Devanagari is एक करोड पचास लाख दश हजार तीन सय अठार छ,

(a) Write the number in the digits.

(b) Write the number in the Devanagari digit using commas.

(c) Write the number in the Hindu Arabic digits using commas.

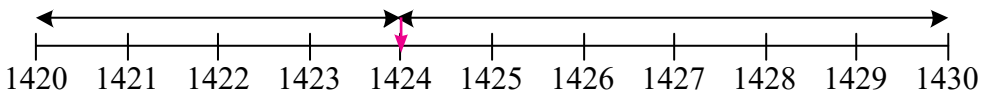
(d) Write the number in digits according to the international system using commas (,).

Project work

Ask your teacher or parents about the total number of voters in the voter list in your district and present the naumbers in the place value table according to the international system.

3.4 Rounding off of the Numbers

Study the following number line and answers these questions:

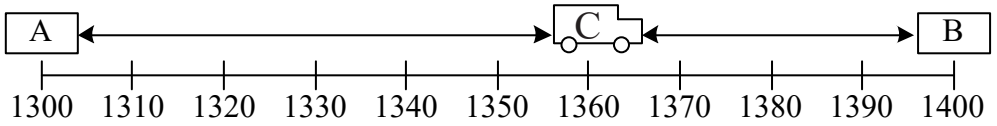


a) How much is it if we round off 1424 to the nearest ten?

b) In the given number line, the number 1424 is closer to which numer; 1420 or 1430?

Activity 9

In the picture given below, there are petrol pumps only at A and B at the following distance. If a vehicle runs out the petrol at C, which petrol pump is appropriate to fuel the vehicle between the petrol pumps A and B? Why? Discuss.

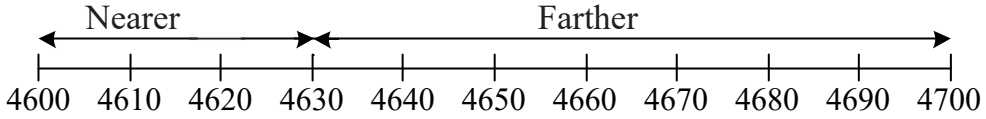


When rounding off a number to the nearest zero, if the digit in one place below the digit to be rounded off is 5 or more than 5, add 1 to the digit to be rounded off and make all the digits zero after it. Similarly, if the digit in the one place less than the digit of the place to be rounded off is less than 5, then leave the digit same and make all the digits zero after it.

Example 8

Round off 4630 to the nearest hundred.

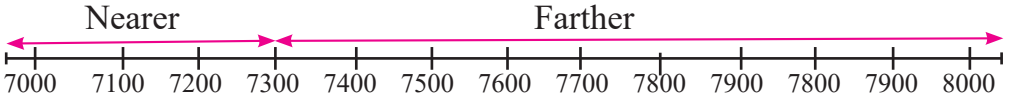
Solution



4600 is the nearer to 4630 than 4700. So, when rounding off 4630 to the nearest hundred, it becomes 4600.

Example 9

Round off 7300 to the nearest thousand.

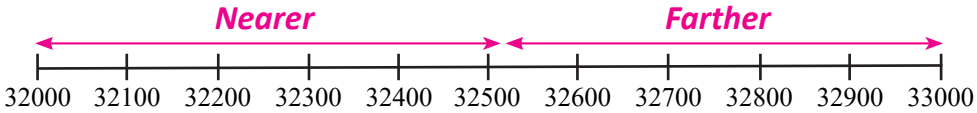


The nearest thousand to 7300 is 7000 than 8000. So, when rounding off 7300 to the nearest thousand, it becomes 7000.

Example 10

Round off 32536 to the nearest thousand.

Solution

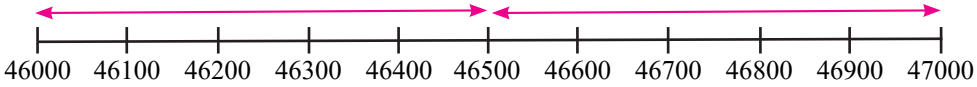


33000 is nearer to 32536. So, when rounding off 32536 to the nearest thousand, it becomes 33000.

Example 11

Round off the 46500 to the nearest thousand.

Solution



46500 is at the equal distance from both 46000 and 47000. When rounding off 46500 to the nearest thousand, we write it as 47000.

Exercise 3.3

1. Fill in the blanks

(a) The hundred below 745 is ….. and the hundred above it is …

(b) The hundred below 1880 is .... and the hundred above it is …

(c) The thousand below 6943 is … and the thousand above it is …

(d) The thousand below 7366 is …….. and the thousand above it is ……..

(e) The thousand below 36400 is …….. and the thousand above it is ……..

2. Which one of the following statements are true and which ones are false? Write it.

(a) 4502 becomes 400 when it is rounded off to the nearest thousand.

(b) 4832 becomes 4800 when it is rounded off to the nearest thousand.

(c) 2405 becomes 2000 when it is rounded off to the nearest thousand.

(d) 2905 becomes 3000 when it is rounded off to the nearest thousand.

(e) 2500 becomes 2000 when it is rounded off to the nearest thousand.

3. Round off the following numbers to the nearest hundred

(a) 1640 (b) 1413 (c) 1250

(d) 2465 (e) 39061 (f) 83140

(g) 17289 (h) 29324

4. Round off the following numbers to the nearest thousand

(a) 2428 (b) 5693 (c) 3250

(d) 78990 (e) 82901 (f) 56999

5. In the following column, the rounded off numbers to the left are given in the right column. Find and match them.

Numbers	Numbers after off to the nearest hundred
1660	1600
1552	14600
1350	1700
14580	16300
16320	1400
	15000

3.5 Prime and Composite Numbers up to 100

Activity 10

Sit in a group with an appropriate number. Each group should write the numbers from 1 to 50 in each square of the square grid of size 10 ×5.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

All the numbers are divided by 1 and each number is divided by itself. Now,

(a) Circle 1

(b) Leave 2 and cross all the numbers that can be divided by 2. For example 4,6,8,…

(c) Leave 3 and cross all the numbers that can be divided by 3. A number crossed once does not need to be crossed again.

(d) Leave 5 and cross all the numbers that can be divided by 5.

(e) Leave 7 and cut all the numbers divided by 7.

All the numbers crossed out are the composite numbers. All the uncrossed numbers are the prime numbers. Based on this, define the prime and composite numbers.

(f) How many prime numbers are there from 1 to 50?

The numbers which are exactly divisible by other numbers except by 1 and itself are called the composite numbers. The numbers which are exactly divisible by only and itself are called the prime numbers. The given method of finding the prime number was first introduced by Greek mathematician Eratosthenes. Thus, the above method is called Sieve of Eratosthenes.

Activity 11

As in activity 10, find how many prime and composite numbers are there from 50-100? Discuss and present in the classroom.

Example 12

In 9 and 19, which is prime number and which is the composite number? Why?

Solution

19 is prime number because 19 is exactly divided by 1 and 19 only.
9 is composite number because it is exactly divided by 1, 3 and 9.

Exercise 3.4

1. Fill in the blanks.

a) There are total … prime numbers from 1 to 10.

b) There are total …….. composite numbers from 1 to 10.

c) The only prime and even number is ……

d) The number which is not the prime and composite is ……

e) All the even numbers except 2 are…… numbers.

2. Which one of the following numbers is prime or composite? Differentiate them.

(a) 4 (b) 5 (c) 8 (d) 9 (e) 13

(f) 15 (g) 17 (h) 23 (i) 39 (j) 53

(k) 64 (l) 75 (m) 91 (n) 99

3. Write the prime numbers which are more than 50 and less than 60.

4. How many composite numbers are there from 75 to 85? Write them.

5. How many prime and composite numbers are there from 1 to 25? Write.

6. Which is the prime and which is the composite number in 27 and 37 and why?

7. The number chart from 1-20 is given below.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

(a) Write the prime numbers from 1 to 20.

(b) Are all the numbers except prime numbers are composite? Give reason?

(c) 1 is neither prime nor composite number. Clarify it with an appropriate reason.

8. Which one is the greatest prime number from 1 to 20 in which:

(a) When 1 is added, what does it becomes; prime or composite? Write with reason.

(b) When 2 is added what does it become; prime or composite? Write with reason.

(c) When 2 is subtracted, what does it become; prime or composite? Write it.

Project work

List out the name and roll number of your friends in the class. Separate your friends into two columns on the basis of prime roll numbers and composite roll numbers. List all of them on the chart paper and present in the classroom.

Lesson 4

Simplification

4.0 Review

Discuss the conditions given below

(a) Your mother gave you 15 chocolates. Again, your father added 5 pieces of chocolates. If you gave 7 pieces of chocolate to your sister how many chocolates will you have left?

(b) Rabin distributed 11 pencils to his friends on the occasion of his birthday among 25 pencils. His mother added 8 more pencils. How many pencils does he have now?

(c) There were 20 birds in a tree. 15 new birds were added to it. In a while, 13 birds flew away from the tree. How many birds are left in the tree now?

(d) How much is in total if 7 is added and 3 is subtracted on 15?

(e) If 15 is subtracted from 35 and 18 is added, how much is in total?

(f) Construct questions from the given problems using the storytelling method.

I. $11 + 2 - 4$

II. $37 - 15 + 8$

Activity 1

A shopkeeper bought seven packets of soap. There are 10 pieces in each packet. The shopkeeper sold 37 pieces of soap. Now, how many pieces of soap are left in the shop? Discuss with your friends and present the result in the classroom.

Solving the above problem

Total soap in 7 packets = 10 ×7=70

Remaining soaps after selling 37 = 70-37=23

In a mathematical statement:

$10 \times 7 - 37$

Doing simplification:

$10 \times 7 - 37$

$= 70 - 37$ [doing multiplication]

$= 23$ [doing subtraction]

Activity 2

Shila distributed 55 pencils to her 11 friends equally. Her father gave two packets containing 5 pencils to a friend among those friends. Now, how many pencils does Shila's friends have in total? Discuss it with your friends and present the solution in the classroom.

Solving above problem

Distributing 55 pencils to 11 friends,

One friend gets = 55 ÷ 11 =5

Total pencil Shila's friend gets from her father = 2 × 5 =10

Total pencils that Shila's friend have = 5 + 10 = 15

Writing in mathematical statement

$55 \div 11 + 5 \times 2$

Simplifying it

$55 \div 11 + 5 \times 2$

$= 5 + 5 \times 2$ [doing division operation]

$= 5 + 10$ [doing multiplication operation]

$= 15$ [doing addition operation]

Example 1

On his birthday, Lakhan distributed 15 colored pencils to his classmates at the rate of 10 each but 4 colored pencils were left with him. How many colored pencils were there at the beginning?

Solution

Here,

Writing in mathematical statement

$15 \times 10 + 4$

Doing simplification,

$15 \times 10 + 4$

$= 150 + 4$ [doing multiplication operation]

$= 154$ [doing addition operation]

Hence, Lakhan has 154 colored pencils at the beginning.

Example 2

Rama divided 9 oranges that she had into 3 equal parts. She gave two parts to her friend. If Rama had 17 oranges, how many oranges are left with her now?

Solution

Here, writing in mathematical statement;

$17 - 9 \div 3 \times 2$

Doing simplification;

$17 - 9 \div 3 \times 2$

$17 - 3 \times 2$ [doing division operation]

$= 17 - 6$ [doing multiplication operation]

$= 9$

Thus, Rama has 9 oranges now.

Example 3

Simplify:

$55 \div 5 + 7 \times 3$

$= 11 + 7 \times 3$ [doing division operation]

$= 11 + 21$ [doing multiplication operation]

$= 32$ [doing addition operation]

Example 4

Simplify:

$10 \times 9 + 84 \div 12$

$= 90 + 84 \div 12$ [doing multiplication operation]

$= 90 + 7$ [doing division operation]

$= 97$ [doing addition operation]

Doing simplification of the problems involving the addition, subtraction, multiplication and division,

(a) Multiplication and division must be done first. Even in the operation of division and multiplication, when going from left to right, the operation that comes first should be done first.

(b) If only addition and subtraction operations are involved, then any one can be done first.

Exercise 4

1. Fill in the blanks.

(a) $5 \times 63 \div 7 =$ .....

(b) $6 \times 6 -$ ..... $= 25$

(c) $24 \div 8 \times 6 =$ .....

(d) $10 \times 40 \div$ ..... $= 40$

(e) $35 \div 5 \times 6 + 3 =$ .....

(f) $64 \div 16 \times 6 - 1 =$ ...

(g) .... $\times 4 + 3 = 23$

(h) $20 - 4 - 2 =$ .....

(i) $44 \div 11 \times 6 -$ ....$= 20$

2. Write in mathematical statements and simplify the following.

(a) How much is in total if 3 is added to 2 times 5?

(b) How much is in total if 7 is added to 3 times 12?

(c) What is the result of subtracting 5 from one third of 36 and adding 7?

(d) What is the result when 50 is added to 10 times 15 and 200 is subtracted?

(e) How much is left after subtracting two times the one third of 9 from 15?

3. Write in mathematical statement and simplify.

(a) There were 20 marbles with Kripa. Out of them, she gave 18 marbles to her sister. Her friend added 16 marbles. How many marbles did she have in total?

(b) Pasang and Alam picked 20 apples each and put them in a single bag. Out of them, 17 apples are given to other friends. Now, how many apples are left in the bag?

(c) In Basanta's wedding, 2 buses containing 26 people each have gone to janti. 6 people including the groom are in a taxi. How many people in total have gone in the wedding?

(d) Shanta went her mamaghar in dashain for Tika. Her mama gave her Rs 300 and maiju gave her Rs. 200 for dakshina. On the way back, she spent Rs. 75 for lunch, how much money is left now?

(e) What is the result of subtracting 5 from the quotient when 666 is divided into 6 parts and 20 is added?

(f) What is the result of subtracting the product of 8 and 13 from the sum of 121 and 83?

(g) Prabin bought 9 exercise book per Rs. 80 and gave Rs. 1000 to the shopkeeper. How much money does he get back?

4. Simplify:

(a) $5 \times 8 - 6 \div 2$

(b) $14 + 9 \div 3 \times 2$

(c) $7 + 6 \div 2 \times 18$

(d) $102 - 12 \times 6 + 6$

(e) $39 - 18 \div 3 + 2 \times 2$

(f) $15 \div 5 \times 4 + 2$

(g) $30 \div 6 + 10 - 2 \times 5$

(h) $52 \div 13 \times 10 + 5 - 10$

(i) $8 \times 9 \div 9 - 10 + 5 \times 6$

5. Write the following sentences into mathematical statements and simplify them.

(a) Rita bought an exercise book for Rs. 50 out of Rs 85 she had. Her maiju has added Rs. 70, then how many rupees does she have now?

(b) Lakhan bought 3 kg sugar costing Rs. 90 per kg and teabag for Rs. 150 from a shop. How much is his total expenditure?

(c) Ashish bought 5 packets of chocolate having 20 chocolates in one packet and 8 open chocolates. Among them, he distributed 80 chocolates to his friends.

I) Write the above sentence in a mathematical statement

II) Find how many chocolates are left with Ashis.

d) Pemba had Rs 20. Among it, he gave Rs. 12 to his sister. His mother added Rs 15. Now, how much rupee does Pemba have?

Project work

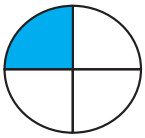
Ask your parents about the price of items used at your home, such as 1 packet of salt and 1 packet of oil. At that rate what is the total price of 4 packets salt and 5 packets of oil? Write the above sentence in mathematical statement and calculate it. Present your calculation in the classroom.

Lesson 5

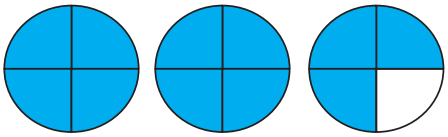
Fraction

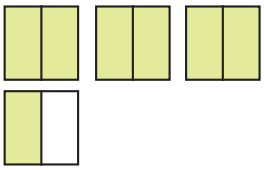
5.0 Review

i. Observe the following figures and discuss the questions given below:

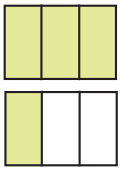
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

Questions for discussion:

a) Write the colored parts in fraction.

b) Among the above fraction, distinguish which one of them are proper fraction, improper fraction or mixed numbers.

c) What kind of fraction are called proper fraction, improper fraction and mixed numbers?

ii. Differentiate the proper fraction, improper fraction and mixed numbers among $\frac{5}{6}$, $\frac{3}{4}$, $\frac{7}{4}$, $1\frac{1}{6}$, $2\frac{3}{4}$.

Here, in $\frac{5}{6}$ and $\frac{3}{4}$, the numerator is less than the denominator. So, these are proper fractions.

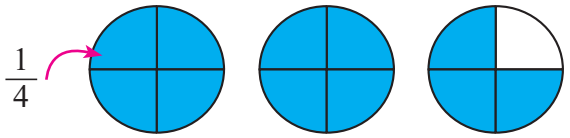
In fraction $\frac{7}{4}$ and $\frac{5}{3}$, the numerator is greater than the denominator. So, these fractions are called the improper fractions.

$1\frac{1}{6}$ and $2\frac{3}{4}$ are the combination of whole number and proper fraction. So, these are mixed numbers.

5.1 Conversion of Improper Fraction and Mixed Numbers to each other

Activity 1

In the given figure write the colored part into improper and mixed number. How can you convert them to each other? Discuss.



First method: $4\ \frac{1}{4}$ $4\ \frac{1}{4}$ $3\ \frac{1}{4}$

$(4+4+3)\ \frac{1}{4} = \frac{11}{4}$ which is an improper fraction.

Second method: 2 wholes and: $\frac{3}{4} = 2\frac{3}{4}$ which is a mixed number.

Now, look at the relation between $2\frac{3}{4}$ and $\frac{11}{4}$.

$$2\ \overset{+}{\underset{\times}{}}\ \frac{3}{4} = \frac{4 \times 2 + 3}{4} = \frac{11}{4}$$

In this way, mixed numbers can be converted into improper fractions. Again, dividing numerator by denominator in $\frac{11}{4}$ quotient is 2 and remainder is 3. Thus, it can be written as : quotient $\frac{\text{remainder}}{\text{denominator}}$ or $2\frac{3}{4}$. In this way, an improper fraction can be converted to a mixed number.

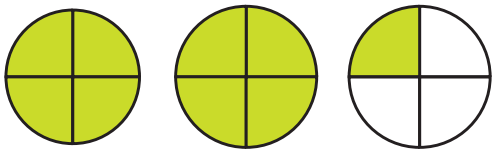
Example 1

Convert mixed number into improper fraction: $2\frac{1}{4}$

Solution

Showing $2\frac{1}{4}$ by coloring it.

Here, 2 whole and $\frac{1}{4}$ parts are colored. The third is divided into 4 equal parts. So, dividing wholes into 4 equal parts:

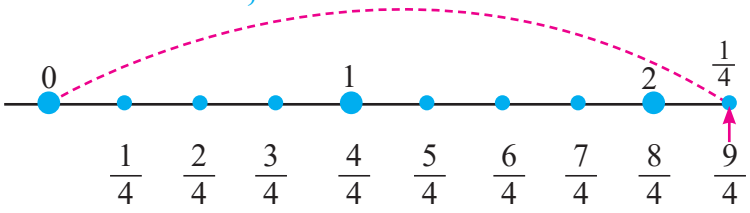


In the first and the second figures, there are 8 numbers of $\frac{1}{4}$ and in the third figure, there is only one $\frac{1}{4}$ .Thus, total number of $\frac{1}{4}$ is 9 i.e $\frac{9}{4}$.

It can be done as given below:

$2\frac{1}{4} = \frac{4 \times 2 + 1}{4} = \frac{9}{4}$ [multiply denominator 4 by 2 and add 1 to the numerator and place it above and denominator 4 below]

Showing in number line,



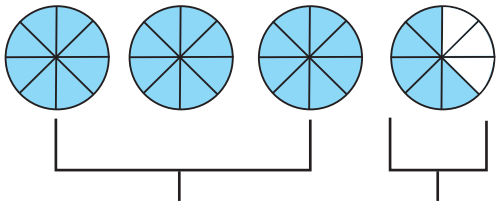
Example 2

Convert the given improper fraction to mixed number: $\frac{29}{8}$

Solution

Here,

When showing $\frac{29}{8}$ by coloring,



3 whole $\frac{5}{8}$

$= 3\frac{5}{8}$

Next method

$\frac{29}{8} = 3\frac{5}{8}$

$$8\overline{)29}\ 3$$
$$-24$$
$$5$$

[in $\frac{29}{8}$, when numerator is divided by denominator the quotient is 3 and remainder is 5.]

Example 3

In Kanya Secondary School, there are 15 female teachers among 25 teachers in total.

(a) How many male teachers are there?

(b) Write the part of the female teacher in fraction.

(c) Write the part of the male teacher in fraction.

(d) Show the fraction indicating the female and male teachers in color.

(e) Write what has become proper fraction, improper fraction or mixed number.

Solution

Here, total teachers = 25

Number of female teachers = 15

Number of male teachers = 25-15= 10

Fraction of female teachers = $\frac{15}{25}$

Fraction of male teachers = $\frac{10}{25}$

Here, numerator is less than denominator. So, the given fraction are proper fractions.

Exercise 5.1

1. **Write the proper fraction so that the denominator is the same as the given fractions.**

   (a) $\frac{3}{5}$ (b) $\frac{3}{4}$ (c) $\frac{5}{8}$

2. **Write the improper fraction so that the denominator is the same as the given fractions.**

   (a) $\frac{5}{4}$ (b) $\frac{3}{2}$ (c) $\frac{6}{5}$

3. **Write the given fraction into ascending order.**

   (a) $\frac{2}{9}, \frac{7}{9}, \frac{3}{9}, \frac{9}{9}$ (b) $\frac{8}{7}, \frac{1}{7}, \frac{5}{7}, \frac{2}{7}$ (c) $\frac{3}{5}, \frac{1}{5}, \frac{4}{5}, \frac{2}{5}$

4. **Write the given fractions into descending order.**

   (a) $\frac{2}{13}, \frac{7}{13}, \frac{3}{13}, \frac{9}{13}$ (b) $\frac{8}{7}, \frac{1}{7}, \frac{5}{7}, \frac{2}{7}$ (c) $\frac{3}{8}, \frac{1}{8}, \frac{5}{8}, \frac{7}{8}$

5. **There are 6 red balls, 10 green balls, and 13 blue balls of the same shape and size in a bag.**

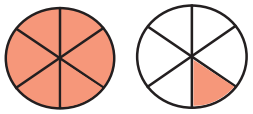
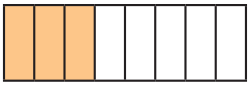
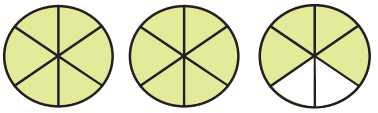
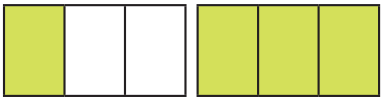
   (a) How many total balls are there in the bag? Write it.

   (b) How much of the total ball is the red ball? Show in fraction.

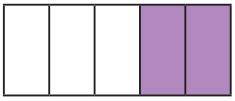
   (c) How much of the total ball is the green ball? Show in fraction.

   (d) How much of the total ball is the blue ball? Show in fraction.

6. Choose the correct answer of the fraction represented by the colored part in the pictures given below and write.

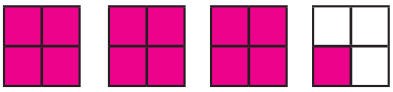
(a)		$\frac{1}{2}$	$\frac{3}{6}$	$\frac{5}{6}$	$\frac{1}{6}$	$\frac{5}{6}$
(b)		$\frac{5}{6}$	$\frac{3}{4}$	$1\frac{1}{6}$	$\frac{1}{3}$	$\frac{7}{6}$
(c)		$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{7}$	$\frac{6}{8}$
(d)		$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{9}{4}$
(e)		$3\frac{4}{6}$	$\frac{16}{6}$	$\frac{4}{5}$	$2\frac{4}{6}$	$\frac{4}{6}$
(f)		$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{5}$	$\frac{3}{2}$
(g)		$\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{1}{4}$	$\frac{4}{3}$
(h)		$\frac{1}{6}$	$\frac{2}{6}$	$\frac{4}{3}$	$1\frac{1}{3}$	$\frac{2}{5}$
(i)		$\frac{1}{5}$	$\frac{1}{6}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{4}{5}$

7. In the pictures given below, write the colored part into fraction. Which one is proper fraction, improper fraction or mixed number? Write it.

(a) 

(b) 

(c) 

(d) 

8. Differentiate which one of the given fractions is proper fraction, improper fraction or mixed number. Write .

$2\frac{1}{3}$ $4\frac{1}{3}$ $\frac{1}{2}$ $\frac{5}{3}$ $\frac{2}{4}$ $\frac{6}{4}$ $\frac{15}{9}$ $\frac{1}{3}$ $\frac{8}{5}$ $\frac{6}{3}$

9. Convert into improper fraction.

(a) $3\frac{5}{8}$ (b) $13\frac{1}{2}$ (c) $8\frac{2}{5}$ (d) $17\frac{1}{3}$ (e) $20\frac{3}{5}$

(f) $3\frac{5}{7}$ (g) $3\frac{1}{12}$ (h) $5\frac{2}{7}$ (i) $7\frac{1}{13}$ (j) $8\frac{3}{9}$

10. Convert into mixed number.

(a) $\frac{25}{7}$ (b) $\frac{17}{4}$ (c) $\frac{40}{6}$ (d) $\frac{18}{5}$ (e) $\frac{32}{9}$

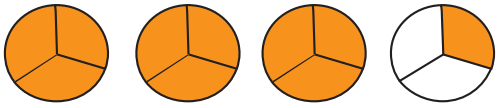
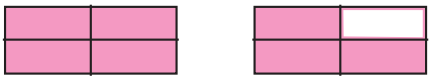
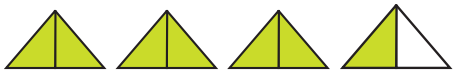
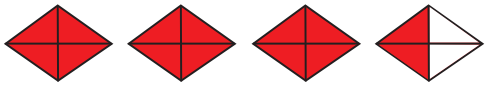
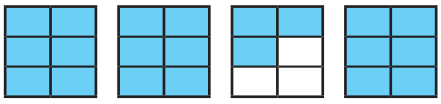
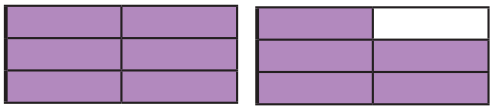
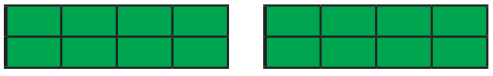
(f) $\frac{15}{7}$ (g) $\frac{37}{12}$ (h) $\frac{62}{7}$ (i) $\frac{105}{13}$ (j) $\frac{43}{9}$

11. Define the following with an example of each.

(a) Like fraction (b) Unlike fraction (c) Proper fraction

(d) Improper fractions (e) Mixed number

12. In the given pictures, write the colored part in improper fraction or mixed number.

		Improper fraction	*mixed number*
(a)		$\frac{10}{3}$	$3\frac{1}{3}$
(b)			
(c)			
(d)			
(e)			
(f)			
(g)			
(h)			

13. Draw a picture representing the following fraction or number and color it.

(a) $1\frac{7}{8}$ (b) $\frac{7}{4}$ (c) $\frac{7}{10}$

14. There are 27 students in class five of Ranipauwa Secondary School, Salyantar. Among them, 14 are girls.

(a) How many boys are there?

(b) How much of the total students is boys? Write in fraction.

(c) How much of the total students is girls? Write in fraction.

(d) Color the fraction that represent the numbers of boys and number of girls.

(e) Identify and write whether the fraction is proper, improper or mixed number.

Project work

Take a circular or rectangular paper strip. Prepare models of each of proper fraction, improper fraction and the mixed number for that strip. Paste them in a single cardboard and present it in the classroom.

5.2 Addition and Subtraction of Fractions with same Denominator

Activity 2

The given cake is taken for Anupama's birthday. Observe the picture of the cake and discuss the solutions to following questions:

(a) Express the parts of cake eaten by Anupama, Junita, Anupama's brother and her father in fraction.

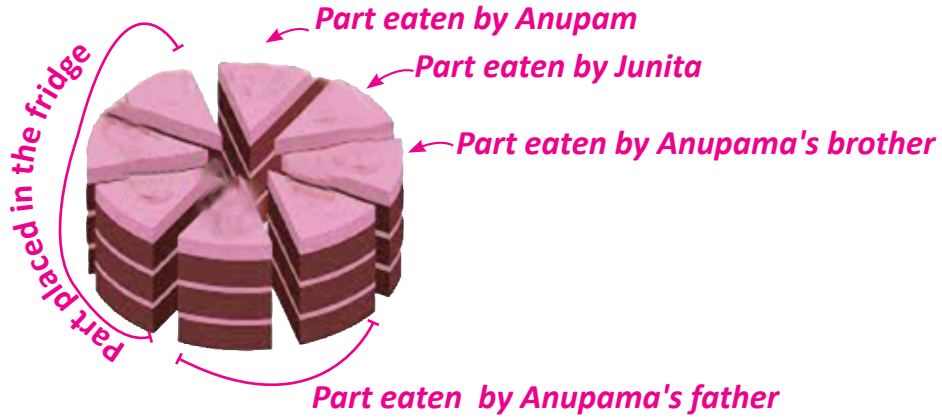
(b) Express the part of the cake placed in the refrigerator in fraction.

(c) Express the total part eaten by Anupama and Junita in terms of fraction.

(d) Express the total parts of cake eaten by Junita, Anupama and her father in fraction.

(e) How much more cake was placed in the refrigerator than the part eaten by Anupama's brother? Find it.

(f) Which is more, between the part placed in the refrigerator or the part eaten by Anupama's father?



Here, value of one piece of cake = $\frac{1}{8}$

Part of the cake eaten by Anupama = one of 8 equal parts = $\frac{1}{8} = \frac{1}{8}$

Part of the cake eaten by Junita = one of 8 equal parts = $\frac{1}{8} = \frac{1}{8}$

Part of the cake eaten by Anupama's father = two parts of 8 equal parts = $\frac{2}{8}$

Cake placed in the fridge = three of the 8 equal parts = $\frac{3}{8}$

The total part of cake eaten by Anupama and Junita = $\frac{1}{8} + \frac{1}{8}$ = two parts of 8 equal parts = $\frac{2}{8}$

The total part of cake eaten by Junita, Anupama and her father = $\frac{1}{8} + \frac{1}{8} + \frac{2}{8}$

One part of 8 equal parts + One part of 8 equal parts + 2 parts of 8 equal parts.

= (1+1+2) parts of 8 equal parts

= Four parts of 8 equal parts = $\frac{4}{8}$

Again, the part of cake placed in the fridge = $\frac{3}{8}$

Part of cake eaten by Anupama's brother = $\frac{1}{8}$

Since, $\frac{3}{8} > \frac{1}{8}$ so, the part of the cake placed in fridge is more.

Now, $\frac{3}{8} - \frac{1}{8}$

3 times of $\frac{1}{8}$ – 1 time of $\frac{1}{8}$

2 times of $\frac{1}{8} = \frac{2}{8}$ more cake was placed in the fridge.

The part of cake eaten by Anupama's father = $\frac{2}{8}$

So, $\frac{3}{8} > \frac{2}{8}$ and the part placed in the fridge is more.

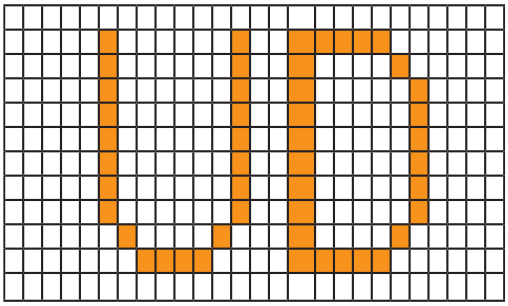
The part placed in the fridge is $\frac{3}{8} - \frac{2}{8}$

3 times of $\frac{1}{8}$ – 2 times of $\frac{1}{8}$

1 time of $\frac{1}{8} = \frac{1}{8}$

Activity 3

Take a grid paper. Write the first letters of your name and surname as given below (e.g. Utsab Dhakal)



a) Write the fraction of squares colored in U of the grid paper.

b) Write the fraction of squares colored in D of the grid paper.

c) Write the fraction of total number of squares in U and D of the grid paper.

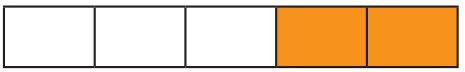
Example 5

Bimal dug $\frac{2}{5}$ of a farm. Nilam dug $\frac{1}{5}$ of the same field. Find the total part of the field dug by them.

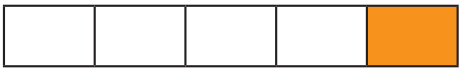
Solution

Expressing the above problem in mathematical sentence, $\frac{2}{5} + \frac{1}{5}$

Presenting the given fractions in figure,



$\frac{2}{5}$



$\frac{1}{5}$

Alternative method

$\frac{2}{5} + \frac{1}{5} = \frac{2+1}{5} = \frac{3}{5}$

2 times of $\frac{1}{5}$ + 1 time of $\frac{1}{5}$ = 3 time of $\frac{1}{5}$ = $\frac{3}{5}$

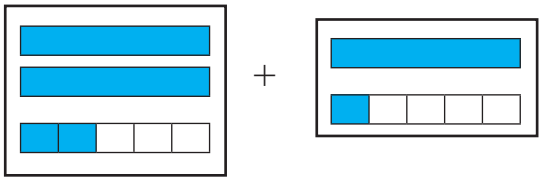
Therefore, they dug $\frac{3}{5}$ of the field in total.

Example 6

Add : $2\frac{2}{5} + 1\frac{1}{5}$

Solution

Presenting the given fractions in picture,



$2\frac{2}{5}$ $1\frac{1}{5}$

3 wholes and 3 times of $\frac{1}{5} = 3\frac{3}{5}$

$2\frac{2}{5} + 1\frac{1}{5}$

$= (2 + 1) + (\frac{2}{5} + \frac{1}{5})$

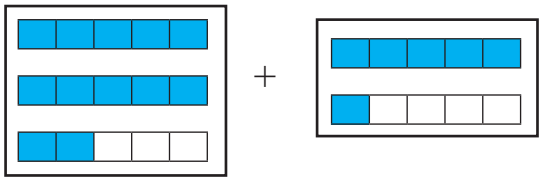
$= 3 + (\frac{2}{5} + \frac{1}{5})$

$= 3 + (\frac{2+1}{5})$

$= 3 + \frac{3}{5}$

$= 3\frac{3}{5}$

Now, dividing all in 5 equal parts,



12 times of $\frac{1}{5}$ + 6 times of $\frac{1}{5}$

= 18 times of $\frac{1}{5}$ = $\frac{18}{5} = 3\frac{3}{5}$

Alternative method

$2\frac{2}{5} + 1\frac{1}{5}$

$= \frac{5 \times 2 + 2}{5} + \frac{5 \times 1 + 1}{5}$ [converting in improper fraction]

$= \frac{12}{5} + \frac{6}{5} = \frac{12 + 6}{5}$ [Adding numerator and writing common denominator]

$= \frac{18}{5}$

$= 3\frac{3}{5}$ [Converting into mixed number]

To add line fractions, we add numerator. The same denominator is taken. While adding two or more mixed numbers, we add the whole part to whole part and proper fraction to proper fractions.

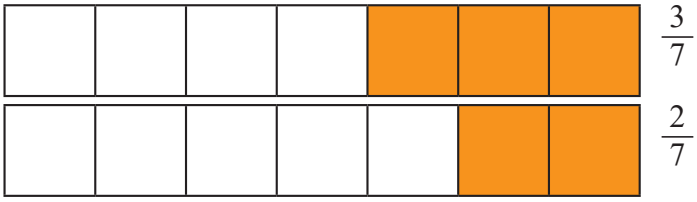
Example 7

Baburam gave $\frac{3}{7}$ and $\frac{2}{7}$ of his money to her wife and daughter respectively. How much more money did he give to his wife?

Solution

Here, writing the given problem in mathematical sentence, $\frac{3}{7} - \frac{2}{7}$

Presenting the given fractions in figures:



3 times of $\frac{1}{7}$ – 2 times of $\frac{1}{7}$ = 1 times of $\frac{1}{7}$ $= \frac{1}{7}$

Hence, he gave $\frac{1}{7}$ more money to his wife.

Alternative Method

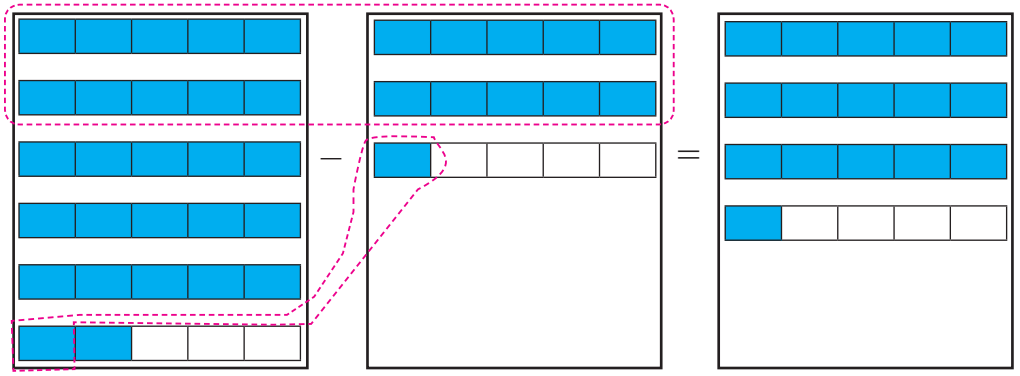
$$\frac{3}{7} - \frac{2}{7} = \frac{3-2}{7} = \frac{1}{7}$$

Example 8

Subtract: $5\frac{2}{5} - 2\frac{1}{5}$

Solution

Here,



$5\frac{2}{5} - 2\frac{1}{5}$

$= (5 - 2) + (\frac{2}{5} - \frac{1}{5})$

$= 3 + \frac{1}{5}$

$= 3\frac{1}{5}$

Alternative method

$5\frac{2}{5} - 2\frac{1}{5}$

$= \frac{5 \times 5 + 2}{5} - \frac{2 \times 5 + 1}{5}$ [Converting into improper fraction]

$= \frac{27}{5} - \frac{11}{5} = \frac{27 - 11}{5}$ [Subtracting smaller numerator from larger and writing common denominator]

$= \frac{16}{5}$

$= 3\frac{1}{5}$

To subtract the like fractions, we should subtract the numerator and place the denominator common. We should subtract whole from whole and fraction from fraction to subtract mixed numbers.

Example 9

Ram's father went to market for Dashain shopping. He bought $3\frac{1}{5}$ meter cloth for Ram, $5\frac{1}{5}$ meter cloth for Ram's mother and $2\frac{1}{5}$ meter cloth for Ram's sister. How many meter of cloth did Ram's father buy?

Solution

Here, for Ram = $3\frac{1}{5}$ meter

For Ram's mother= $5\frac{1}{5}$ meter

For Ram's sister = $2\frac{1}{5}$ meter

Total cloth = $3\frac{1}{5} + 5\frac{1}{5} + 2\frac{1}{5}$

$= 3\frac{1}{5} + 5\frac{1}{5} + 2\frac{1}{5}$

$= (3 + 5 + 2) + (\frac{1}{5} + \frac{1}{5} + \frac{1}{5})$

$= 10 + (\frac{1}{5} + \frac{1}{5} + \frac{1}{5})$

$= 10 + (\frac{1+1+1}{5})$

$= 10 + \frac{3}{5} = 10\frac{3}{5}$

Hence, total cloth $10\frac{3}{5}$ meter.

Example 10

Calculate: $13\frac{1}{3} - 5\frac{1}{3} + 7\frac{1}{3}$

Solution

Here, $13\frac{1}{3} - 5\frac{1}{3} + 7\frac{1}{3}$

$= (13 - 5 + 7) + (\frac{1}{3} - \frac{1}{3} + \frac{1}{3})$

$= (20 - 5) + (\frac{1}{3} - \frac{1}{3} + \frac{1}{3})$

$= 15 + (\frac{1}{3})$

$= 15\frac{1}{3}$

Alternative method

Here, $13\frac{1}{3} - 5\frac{1}{3} + 7\frac{1}{3}$

$= \frac{13 \times 3 + 1}{3} - \frac{5 \times 3 + 1}{3} + \frac{7 \times 3 + 1}{3}$ [Converting into improper fraction]

$= \frac{40}{3} - \frac{16}{3} + \frac{22}{3}$

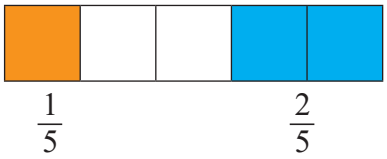
$= \frac{40 - 16 + 22}{3}$

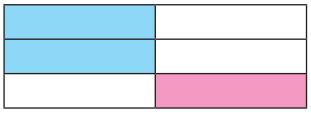
$= \frac{62 - 16}{3} \quad = \frac{46}{3}$

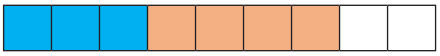
$= 15\frac{1}{3}$ [Converting into mixed number]

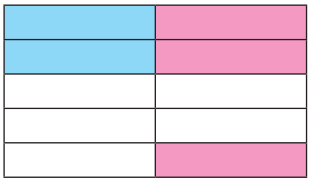
Exercise 5.2

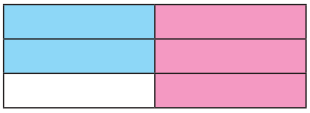
1. Express the parts with different colors in fraction and add these fractions.

(a) 

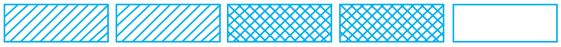
(b) 

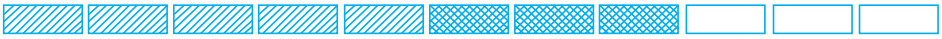
(c) 

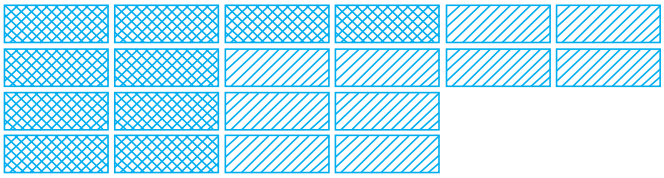
(d) 

(e) 

2. Write the fraction of the total shaded parts and double shaded parts in fractions. Subtract the fraction of double shaded parts.

(a) 

(b) 

(c) 

3. Calculate.

(a) $\frac{7}{12} + \frac{4}{12}$ (b) $\frac{11}{17} + \frac{5}{17}$ (c) $\frac{5}{8} + \frac{1}{8} + \frac{3}{8}$

(d) $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$ (e) $\frac{7}{8} - \frac{3}{8}$ (f) $\frac{5}{11} - \frac{3}{11} - \frac{3}{11}$

4. Calculate.

(a) $17\frac{1}{5} + 6\frac{1}{5} - 8\frac{1}{5}$

(b) $8\frac{7}{10} - 2\frac{1}{10} - 3\frac{3}{10}$

(c) $3\frac{7}{11} - 2\frac{1}{11} + 6\frac{3}{11}$

(d) $1\frac{1}{4} + 6\frac{3}{4} + 7\frac{1}{4}$

(e) $12\frac{7}{12} - 3\frac{3}{12} - 3\frac{1}{12}$

(f) $3\frac{2}{7} - 2\frac{1}{7} + 6\frac{4}{7}$

5. Among the money in a bag, Ram took $\frac{1}{7}$, Shyam took $\frac{3}{7}$ and Hari took $\frac{2}{7}$ of the money. How much money did they take in total?

6. Among all the seats in a cinema hall, $\frac{1}{8}$ are first class and $\frac{3}{8}$ are second class. How many seats are first and second class in total?

7. In a garden, $\frac{1}{5}$ plants are of orange and $\frac{2}{5}$ plants are of mango. Which plant are more and how much more are they?

8. Among all the oranges Rima has got, she ate $\frac{1}{9}$ and gave $\frac{2}{9}$ to her friend. How much more orange did her friend eat?

9. A shopkeeper has $20\frac{1}{2}$ kg potato. If he sold $9\frac{1}{2}$ kg in this morning and $7\frac{1}{2}$ kg in this evening,

(a) How many kilograms potato was sold in one day?

(b) How many kilograms potato is left?

10. Binita travelled $18\frac{4}{5}$ kilometer by bus and $3\frac{2}{5}$ kilometer in Jeep for Mama's home in Dashain. How much kilometer did she travel in?

11. How much part will remain if we cut $\frac{2}{3}$ of a stick? Find it.

12. Shreesh got three days vacation on Saturday, Sunday and Monday, for general election. He completed $\frac{1}{7}$ of his work in Saturday, $\frac{2}{7}$ of his work in Sunday and $\frac{4}{7}$ of his work in Monday.

(a) How much work did he complete in three days' vacation?

(b) Find Shreesh's remaining work

(c) Find in which day he worked more and on which day he worked less.

13. Mamata went home in Dashain for tika. She brought $5\frac{1}{2}$ kg of beans $8\frac{1}{2}$ kg of siltung and $3\frac{1}{2}$ kg of mas daal. She mixed them,

(a) How much kg of legumes (gedagudi) does she have now?

(b) Her house owner farours local produce.She gave $1\frac{1}{2}$ kg of legumes to her house owner. How much legumes is left for her?

14. Gagan spent $\frac{1}{5}$ of his money for lunch and $\frac{2}{5}$ for exercise book.

(a) How much part of his money did is spent? Show in term of fraction.

(b) How much part of money is saved? Show in terms of fraction.

(c) If Gagan had Rs.1,000, find his the expenditure and saving amount.

Project work

Take an apple or any other fruit. Cut it into 8 equal parts. Give 3 parts to your brother. Give two parts to your mother and eat the remaining part. Write the fraction of apple eaten by all three members. Add all the fractions and present in the classroom.

Lesson 7

Decimal

6.0 Review

Observe the figures and discuss in groups.

figure A

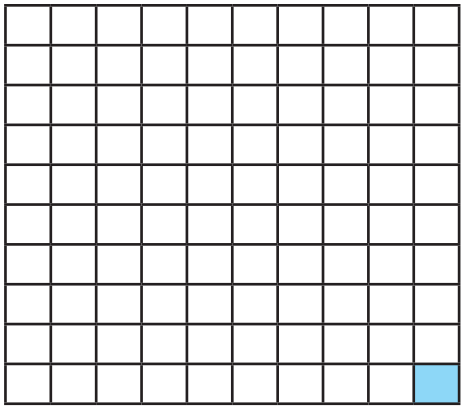


figure B

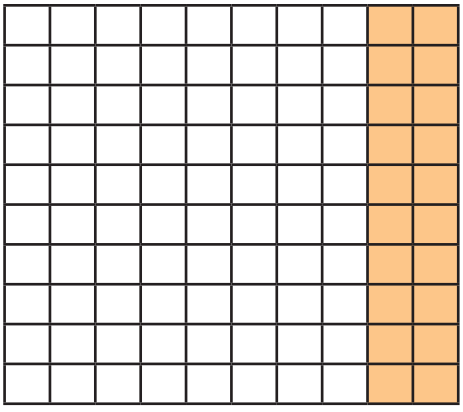


figure C

a) How can we write the fraction of the colored part if each figure?

b) How can we express the colored parts in decimal?

c) How can we read the decimal of each figure?

Here, in the first figure, there are 10 equal parts and one part is colored. The colored part represents $\frac{1}{10}$ or one tenth. We write it as $\frac{1}{10} = 0.1$ We read it as zero point one.

In the second figure, there are 100 equal parts and one part is colored.

The colored part represents $\frac{1}{100}$ or one hundredth. We write it

as $\frac{1}{100}$ = 0.01 We read it as zero point zero one. We can express it as $\frac{1}{100}$ = 1 time of $\frac{1}{100}$ = 1 time of 0.01 = 0.01.

In the third figure, there are hundred equal parts. 20 parts are colored. The colored part represents $\frac{20}{100}$ or 20 hundredth. We can write it as $\frac{20}{100}$ = 0.20 and read as zero point two zero. We can express it as $\frac{20}{100}$ = 20 time of $\frac{1}{100}$ = 20 time of 0.01 = 0.20.

6.1 Conversion of Decimal and Fraction to each other

Activity 1

Observe the following figures and write the blue colored, red colored and green colored parts in the form of fraction and decimal. After that discuss the process of conversion of fraction and decimal.

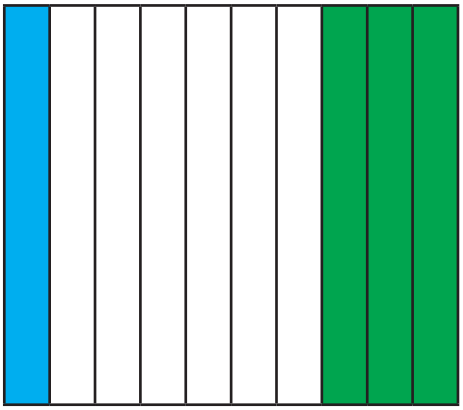


Figure A

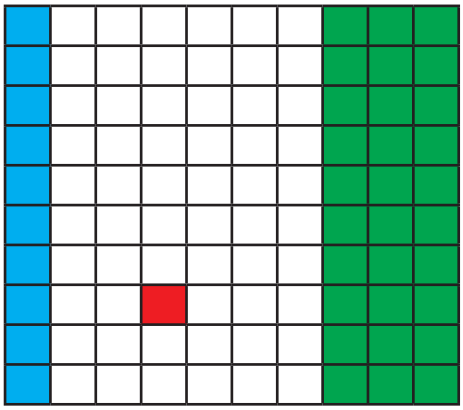


Figure B

In figure A, the blue colored part can be written as $\frac{1}{10}$ in fraction and 0.1 in decimal.

The green colored part can be written as $\frac{3}{10}$ in fraction and 0.3 in decimal.

In figure B, the blue colored part can be written as $\frac{10}{100}$ in fraction and 0.10 in decimal.

The red colored part can be written as $\frac{1}{100}$ in fraction and 0.01 in decimal.

The green colored part can be written as $\frac{30}{100}$ in fraction and 0.30 in decimal.

We can convert the fraction with denominator 10 by placing a decimal in front of one digit from the back. Similarly, we can convert the fraction with denominator 100 by placing the decimal in front of two digits from the back. If the numerator of fraction with denominator 100 contains a single digit number, we place zero (0) in front of that number and place decimal before both the zeros.

To convert the decimal into fraction, place 1 in denominator instead of decimal in numerator and add zeros (0) with equal number of digits after the decimal.

For example, $\frac{1}{10} = 0.1$, $\frac{1}{100} = 0.01$, $\frac{30}{100} = 0.30$

Example 1

Convert the following fractions into decimals:

(a) $\frac{3}{10}$ (b) $\frac{45}{100}$ (c) $\frac{5}{100}$

Solution

Here, (a) $\frac{3}{10} = 0.3$ (b) $\frac{45}{100} = 0.45$ (c) $\frac{5}{100} = 0.05$

Example 2

Convert the following decimals in to fractions into decimals:

(a) 0.4 (b) 0.60 (c) 0.07

Solution

Here, (a) $0.4 = \frac{4}{10}$ (b) $0.60 = \frac{60}{100}$ (c) $0.07 = \frac{7}{100}$

Activity 2

Study the following conversation. Discuss in group and draw the conclusion:

Utsab: Ma'am, we learned the conversion of proper decimal fractions into decimals. Likewise, how can we translate the improper and without decimal fractions into decimals?

Teacher: Utsab that's good issue. Please look at the board. For example; we have to convert $\frac{2}{5}$ into decimals. We have previously learned about the conversion of decimal fractions, haven't we?

Ranjana: Ma'am! I think, we can make the denominator 10 by multiplying it by 2.

Teacher: You are right, Ranjana. The denominator 5 of $\frac{2}{5}$ should be multiplied by 2 to make 10. So, we have to multiply both denominator and numerator by 2. Here, $\frac{2 \times 2}{5 \times 2} = \frac{4}{10}$ Now you can write in decimal form. Sometimes, it is not easy to make the denominator 10, 100. In this case, we convert the fraction into decimal by dividing its numerator by denominator. For example: $2 \div 5 = 0.4$

Pemba: How can we convert $\frac{13}{5}$ into decimal?

Teacher: Pemba, first make the denominator 10 as $\frac{13 \times 2}{5 \times 2} = \frac{26}{10}$ In mixed number, we can express it as $2\frac{6}{10}$. Now, $\frac{6}{10} = 0.6$ Therefore, we can write $2\frac{6}{10} = 2.6$ We can solve it by another process as well; $13 \div 5 = 2.6$

$$
\begin{array}{r}
2.6 \\
5\overline{)\,13} \\
-\,10 \\
\hline
30 \\
-\,30 \\
\hline
0
\end{array}
$$

Chhiring: Ma'am, when we convert 2.6 into fractions, is it $\frac{26}{10}$?

Teacher: Yes, Chhirig, you are right! As before, we write the decimal by placing 1 in denominator instead of decimal and add as many zeros after 1 as the number of digits after the decimal.

Conclusion: We should write in decimal by making the denominator 10 or 100 if it is not. So,

For example: $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4$

In improper fraction, we should write in decimal number by converting mixed number after making denominator 10 or 100.

For example, $\frac{13}{5} = \frac{13 \times 2}{5 \times 2} = \frac{26}{10} = 2\frac{6}{10} = 2$ and $0.6 = 2.6$

i.e. we can write in decimal by dividing numerator by denominator of fraction.

Example 3

Convert into decimal.

(a) $\frac{3}{5}$ (b) $\frac{41}{10}$ (c) $5\frac{2}{5}$

Solution

Here,

(a) $\frac{3}{5} = \frac{3 \times 2}{5 \times 2}$ [multiplying both numerator and denominator by 2]

$= \frac{6}{10}$

$= 0.6$

(b) $\frac{41}{10} = 4.1$

(c) $5\frac{2}{5}$

$= 5 + \frac{2 \times 2}{5 \times 2}$ [multiplying both numerator and denominator by 2]

$= 5 + \frac{4}{10}$

$= 5 + 0.4$

$= 5.4$

6.2 Place Value Table of Decimal Number

Activity 3

We have been learning the place value table of counting numbers from grade 4. How can we present the decimal numbers in place value table? Discuss in groups.

For example, 5.42

In 5.42, 5 is in one, 4 is in tenth and 2 is in hundredth. Presenting 5.42 in place value chart:

One	Tenth	Hundredth
5	4	2

$5.42 = 5\ \frac{42}{100}$. So, we can say 5 one and 42 hundredths

Example 1

Present the following decimal numbers in place value table.

(a) 1.4 (b) 3.76 (c) 15.28 (d) 0.79

Solution

(a) Representing 1.4 in the place value table,

One	Tenth
1	4

(b) Representing 3.76 in the place value table,

One	Tenth	Hundredth
3	7	6

(c) Representing 15.28 in the place value table,

Ten	One	Tenth	Hundredth
1	5	2	8

(d) Representing 0.79 in the place value chart,

One	Tenth	Hundredth
0	7	9

Example 5

Convert 3.48 into fraction.

Solution

Here, $3.48 = 3 + 0.48$

$= 3 + \frac{48}{100}$

$= 3\frac{48}{100}$

Therefore, $3.48 = 3\frac{48}{100}$

6.4 Addition and Subtraction of Decimal Number

Activity 4

Write the fraction and decimal of blue, red and green colored parts of the following figures. Based on this, how can we add and subtract the decimals? Discuss in groups.

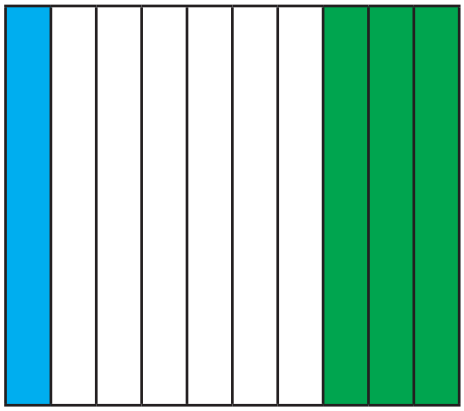


Figure A

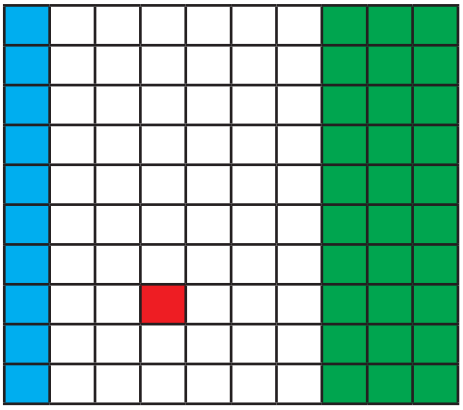


Figure B

In figure A,	fraction	decimal
Blue	$\frac{1}{10}$	0.1
Green	$\frac{3}{10}$	0.3

Total colored part = 0.1 + 0.3

= 1 time 0.1 + 3 times 0.1

= 4 times of 0.1 = 0.4

Alternative method

One	Tenth
0	1
+ 0	3
0	4

0.1 + 0.3 = 0.4

The difference of green and blue color

$= 0.3 - 0.1$

= 3 times of 0.1 – 1 times of 0.1

= 2 times of 0.1 = 0.2

Alternative method

One	Tenth
0	3
– 0	1
0	2

0.1 – 0.3 = 0.2

In figure B	fraction	decimal
Blue	$\frac{10}{100}$	0.10
Red	$\frac{1}{100}$	0.01
Green	$\frac{30}{100}$	0.30

The total colored part

= 0.10 + 0.01 + 0.30

= 10 times of 0.01+ 1 time of 0.01 + 30 times of 0.01

= 41 times of 0.01 = 0.41

Alternative method

One	Tenth
0	10
0	01
+ 0	30
0	41

0.10 + 0.01 + 0.03 = 0.4

The difference of green and blue colored parts.

(a) 0.30 – 0.10

= 30 times of 0.01 – 10 times of 0.01

= 20 times of 0.01 = 0.20

Alternative method

One	Tenth
0	30
– 0	10
0	20

0.30 – 0.10 = 0.20

B) The difference between blue and red colored part

$0.10 - 0.01$

= 10 times of 0.01 – 1 time of 0.01

= 9 times of 0.01 = 0.09

Alternative method

One	Tenth
0	10
– 0	01
0	09

$0.10 - 0.01 = 0.09$

Thinking question: In Figure A) how many 0.01 are there in blue and green colored part?

Example 6

Add:

(a) 0.3 + 0.6 (b) 1.05 + 2.35 (c) 2.5 + 7.82

Solution

(a) **0.3 + 0.6**

= 3 times of 0.1 + 6 times of 0.1

= 9 times of 0.1

= 0.9

Alternative method

One	Tenth
0	3
+ 0	6
0	9

$0.3 + 0.6 = 0.9$

(b) **1.05 + 2.35**

= 105 times of 0.01 + 235 times of 0.01

= 340 times of 0.01

= 3.40

Alternative method

One	Tenth
1	05
+ 2	35
3	40

$1.05 + 2.35 = 3.40$

(c) **2.5 + 7.82**

= 250 times of 0.01 + 782 times of 0.01

= 1032 times of 0.01

= 10.32

Alternative method

One	Tenth
2	50
+ 7	82
10	32

2.50 + 7.82 = 10.32

Example 7

Calculate

(a) 0.7 – 0.2

(b) 5.34 – 2.75

(c) 5.7 – 3.25

(d) 12 – 8.37

Solution

(a) 0.7 – 0.2

= 7 times of 0.1- 2 times of 0.1

= 5 times of 0.1

= 0.5

Alternative method

One	Tenth
0	7
– 0	2
0	5

0.7 – 0.2 = 0.5

(b) 5.34 – 2.75

= 534 times of 0.01 – 275 times of 0.01

= 259 times of 0.01

= 2.59

Alternative method

One	Tenth
1	34
– 2	75
2	59

1.34 – 2.75 = 2.59

(c) 5.7 – 3.25

= 570 times of 0.01 – 325 times of 0.01

= 245 times of 0.01

= 2.45

Alternative method

One	Tenth
5	70
– 3	25
2	45

5.70 – 3.25 = 2.45

(d) 12 – 8.37

= 1200 times of 0.01- 837 times of 0.01

= 363 times of 0.01

= 3.63

Alternative method

One	Tenth
12	00
– 8	37
3	63

12.00 – 8.37 = 3.63

Example 8

How much centimeter of a ribbon will remain if two pieces of 15.91 cm and 17.28 cm are sold from 45 cm?

Solution

Here,

Total length = 45 cm

= 45 – (15.91 + 17.28)

= 45 – 33.19

= 11.81 cm

Another method

Remaining part = 45 – 15.91 – 17.28

= 45.00 – 15.91 – 17.28

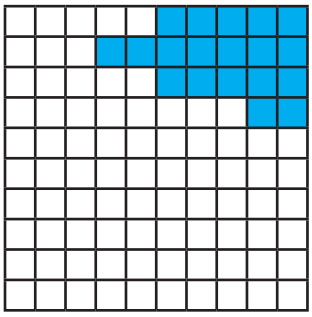
= 29.09 – 17.28

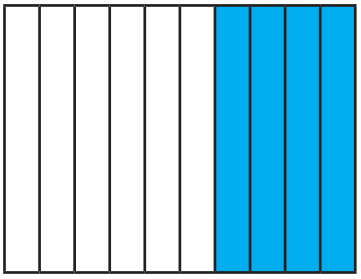
= 11.81 cm

Hence, the length of the remaining ribbon = 11.81 cm.

Exercise 6.1

1. Observe the figures given below and write fraction and decimal of the colored parts.

(a) 

(b) 

(c) 

2. Express the following fractions in decimals.

(a) $\frac{68}{10}$ (b) $\frac{4}{100}$ (c) $\frac{23}{100}$ (d) $\frac{89}{1000}$

(e) $15\frac{1}{4}$ (f) $13\frac{1}{2}$ (g) $23\frac{3}{25}$ (h) $3\frac{1}{4}$

3. Express the following decimals in fractions.

(a) 0.2 (b) 0.38 (c) 13.05 (d) 19.37

(e) 0.37 (f) 6.47 (g) 0.50 (h) 3.25

4. Show the decimal numbers that are given in Q no. 3 in place value table.

5. Simplify:

(a) 23.12 + 71.28 (b) 14 + 71.23 (c) 42.567 + 23.1

(d) 91.8 + 0.83 (e) 1.1 + 3.5 + 4.2 (f) 174.68 – 21.32

(g) 36.5 – 23.14 (h) 312.275 – 25.68

(i) 8.5 – 9.25 + 5.07 (j) 0.08 – 3.27 + 6.347

6. Write the mathematical sentences of the following problems and calculate.

(a) How much centimeter of a ribbon will remain if two pieces of 12.91 cm and 9.28 cm are sold from 25 cm?

(b) How much is it if we subtract the sum of 30.41 and 20.2 from 31.123?

(c) Sita bought a exercise book for Rs. 50.25 and chocolates for Rs. 12.75. She gave 100 rupees to the shopkeeper. How much amount will be returned to her?

(d) The distance from Kathmandu to Pokhara is 200 km. If Suntali travelled 114.375 km by bus and then 66.305 km in taxi, how many kilometres remain to be travelled?

7. A worker is walking by carrying 25.32 kg of sand, 27.12 kg of mud and 12.12 kg of cement in a basket.

(a) Find, how much kg he/she is carrying.

(b) On the way, 4.43 kg of sand is trickled and lost. How many kilograms did he take home?

8 A street vendor takes 25 packets of 2.5 kg tea, 15.25 kg of Sugar, 11.75 kg of *daalmoth*.

(a) how much kg of things does he have in total?

(b) If he sold 1.5 kg of *daalmoth* and 5.5 kg of sugar till 11 am, find the amount of the thing that remain to be sold.

Project work

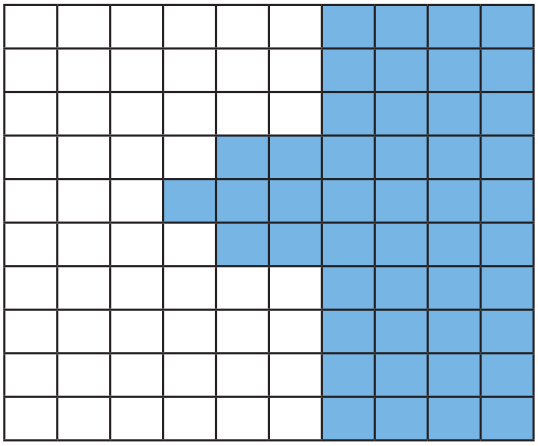
Go shopping with your parents. Ask a shopkeeper and put three different things like potato, onion or daal in digital balance. Write the weight of the different things in your exercise book separately. Find total weight of all three things and present in the classroom

Lesson 7

Percentage

7.0 Review

We learned about presenting the colored parts in terms of fraction and decimals in grade 4. Observe the following figure and discuss the given questions in groups:



(a) Present the colored part in fraction, decimal and percentage.

(b) Present the non-colored part in fraction, decimal and percentage.

	Fraction	Decimal	Percentage
Colored part	$\frac{47}{100}$	0.47	47%
Non-colored part	$\frac{53}{100}$	0.53	53%

If there is 100 in a denominator of a fraction, then its numerator denotes the percentage value. Percentage is denoted by %.

7.1 Conversion of Fractions and Percentage to each other

Activity 1

Observe the following figures and write answers of to the questions:

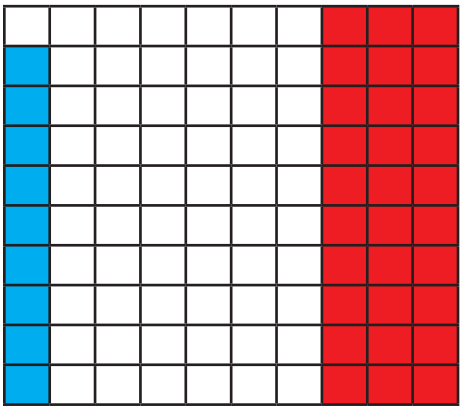


Figure A

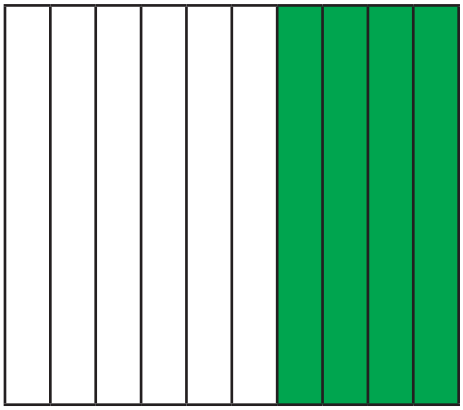


Figure B

(a) Write fraction and percentage of the colored part in the figures.

(b) How can we convert fractions to percentage and vice-versa? Discuss and conclude.

Here, in figure A,

Writing the colored part in fraction and percentage

	Fraction	percentage
Blue coloured part	$\frac{9}{100}$	9%
Red coloured part	$\frac{30}{100}$	30%

In figure B, the fraction of green colored part is $\frac{4}{10}$. The numerator of fraction with denominator 100 represents percentage. So, we should make the denominator 100.

Here, $\frac{4 \times 10}{10 \times 10} = \frac{40}{100}$ (Multiplying numerator and denominator by 10)

$= 40\ \%$

We can show it as;

$\frac{4}{10} \times 100\% = 40\%$ [Multiplied by 100 to convert fraction to percentage.]

The numerator of fraction with denominator 100 represents percentage. To convert the fraction into percentage, we should remove the 100 from denominator by multiplying 100 and then place % sign. The fraction can be converted into percentage by multiplying 100 with % sign although the denominator is not 100. For example, $\frac{30}{100} = \frac{30}{100} \times 100\% = 30\%$ To convert percentage to fraction, first remove percentage % sign and write 100 in denominator. In other words we divide the percent by 100 and remove % sign. For example, $30\% = \frac{30}{100}$.

Activity 2

Study the following table. The marks obtained by Muna in an examination is given here.

Subject	English	Nepali	Mathematics	Science	Local subject
Mark obtained	18	20	40	35	70
Full marks	20	25	50	50	100

(a) Express the full marks and the marks obtained by Muna in fraction.

(b) Convert the fraction of marks obtained in each sbject and into percentage. Discuss with the friends whether they are correct or not.

Example 1

Write the following fractions in percentage.

(a) $\frac{43}{100}$ (b) $\frac{3}{5}$ (c) $\frac{8}{10}$

Solution

Here,

(a) $\frac{43}{100}$

$= 43\%$

Alternative method

$\frac{43}{100} \times 100\%$

$= 43\%$

(b) $\frac{3}{5}$

$= \frac{3 \times 20}{5 \times 20}$ [to make denominator 100]

$= \frac{60}{100} = 60\%$

Alternative method

$\frac{3}{5} \times 100\%$

$= \frac{300}{5}$

$= 60\%$

(c) $\frac{7}{10}$

$= \frac{7 \times 10}{10 \times 10}$ [to make denominator 100]

$= \frac{70}{100} = 70\%$

Alternative method

$\frac{7}{10} \times 100\%$

$= \frac{700}{10}$

$= 70\%$

Example 2

Convert the percentage into fraction:

(a) 5% (b) 45% (c) $14\frac{1}{2}\%$

Solution

Here,

(a) $5\% = \frac{5}{100}$

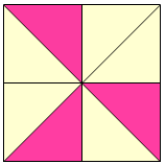
(b) $45\% = \frac{45}{100}$

(c) $14\frac{1}{2}\% = \frac{14 \times 2 + 1}{2}\%$

$= \frac{29}{2}\% = \frac{29}{2 \times 100}$ [dividing by 100 to remove %]

$= \frac{29}{200}$

Example 3



Write the fraction of the colored part and convert it into percentage.

Solution

The fraction of the colored part,

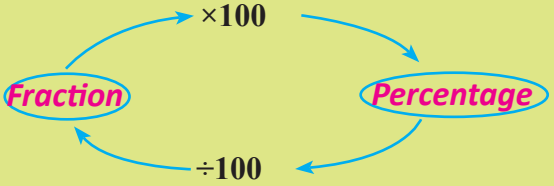
The colored part $= \frac{3}{8}$

$= \frac{3}{8} \times 100\%$ [multiplying fraction by 100 and putting %]

$= \frac{300}{8}\ \%$

$= 37\frac{4}{8}\%$

Based on the above discussion, we can use the following cycle to convert fraction into percentage and the percentage into fruction.



Example 4

There are 55 students in grade 5 of Janajyoti Basic School. Among them, 33 are girls. Then,

(a) What is the number of boys?

(b) Write the number of girls and boys in fraction.

(c) What is the percentage of girls and boys?

(d) What is the sum of percentages of girls and boys?

Solution

Here, total students = 55

Number of girls = 33

(a) Number of boys = 55-33 = 22

(b) The fraction of number of girls and boys:

Boys = $\frac{22}{55}$

Girls = $\frac{33}{55}$

(c) Conversion of fractions into percentage:

Boys = $\frac{22}{55} \times 100\% = 40\%$

Girls = $\frac{33}{55} \times 100\% = 60\%$

(d) The sum of percentage of boys and girls = 60% + 40% = 100%.

7.2 Conversion of Decimal and Percentage to each other

Activity 3

Observe the given figure and answer the following questions:

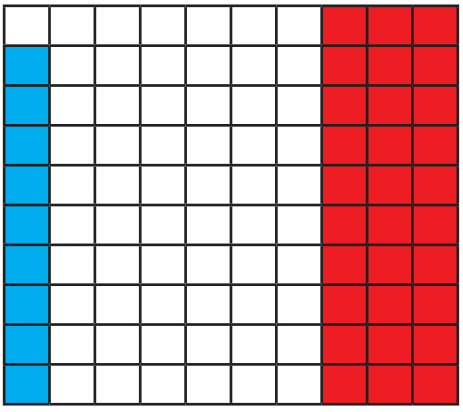


Figure A

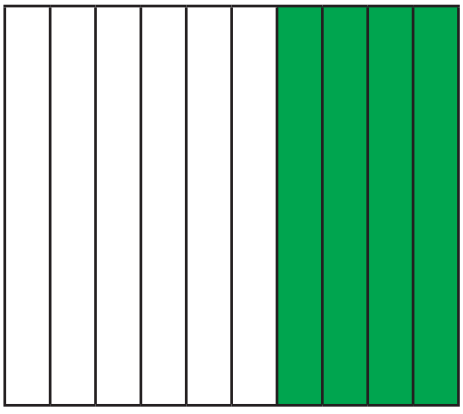


Figure B

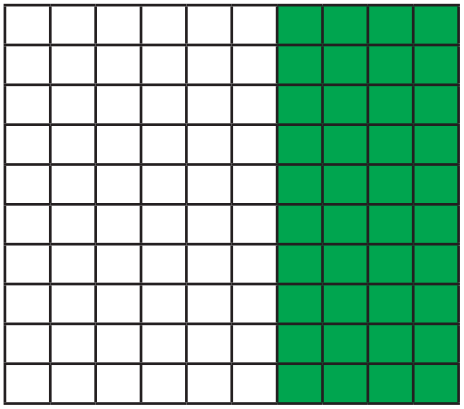
(a) Write the colored parts of the figures in decimal and percentage.

(b) How can we convert decimal and percentage into each other? Discuss and draw the conclusion.

Here, from figure A,

Writing the decimal and percentage of the colored parts:

	Decimal	percentage
Blue colored part	0.09	9%
Red colored part	0.30	30%



In figure B, the decimal of green colored part is 0.4. Here are 10 equal boxes. So, we have to make 100 equal boxes. When we make 10 equal boxes horizontally, then the decimal of green colored part is 0.40 and the percentage is 40%.

Example 5

Convert the decimal into percentage and the percentage into decimal:

(a) 0.75 (b) 75%

Solution

Here,

a) Converting 0.75 into percentage,

$0.75 = 0.75 \times 100\% = 75\%$

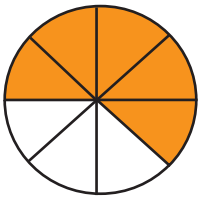
b) Converting 75% into decimal

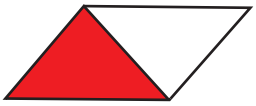
$$75\% = \frac{75}{100} = 0.75$$

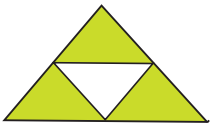
Exercise 7.1

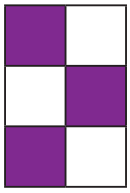
1. Write the fraction of the colored parts of each of the following figures and convert them into percentage.

(a) 

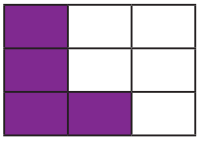
(b) 

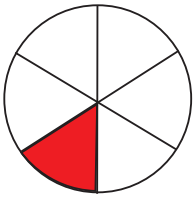
(c) 

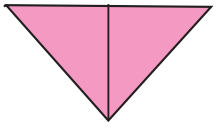
(d) 

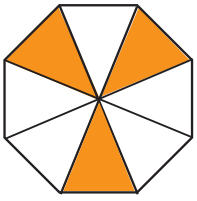
(e) 

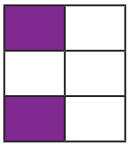
(f) 

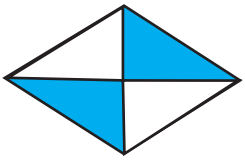
(g) 

(h) 

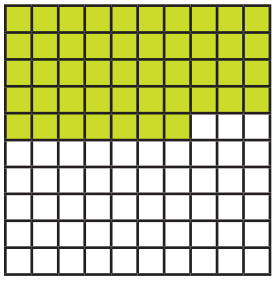
(i) 

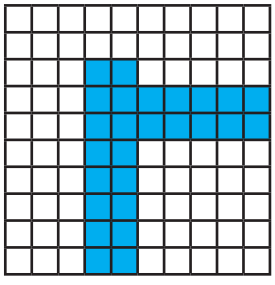
(j) 

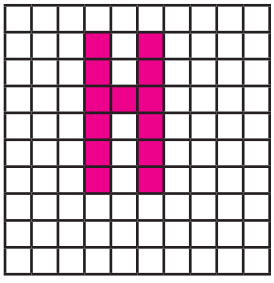
(k) 

(l) 

2. In the given figure, express the colored and non-colored parts into fraction, decimal and percentage:

(a) 

(b) 

(c) 

3. Write in percentage:

(a) $\frac{68}{100}$ (b) $\frac{44}{100}$ (c) $\frac{23}{100}$ (d) $\frac{79}{100}$

(e) $\frac{91}{100}$ (f) $\frac{27}{100}$ (g) $\frac{39}{100}$ (h) $\frac{135}{100}$

4. Convert the following fractions into percentage:

(a) $\frac{1}{2}$ (b) $\frac{3}{5}$ (c) $\frac{10}{11}$ (d) $\frac{7}{5}$ (e) $\frac{3}{2}$

(f) $\frac{27}{50}$ (g) $\frac{24}{25}$ (h) $\frac{13}{100}$ (i) $\frac{3}{4}$ (j) $\frac{13}{25}$

5. Convert the following percentage into fraction:

(a) 25% (b) 15% (c) 35% (d) 20%

(e) 50% (f) 75% (g) 36% (h) 16 %

(i) 125% (j) $15\frac{1}{2}$% (k) $26\frac{1}{4}$ % (l) $12\frac{5}{2}$ %

6. Convert the following decimals into percentage:

(a) 0.15 (b) 0.12 (c) 0.98 (d) 0.23

(e) 0.09 (f) 0.65 (g) 0.79 (h) 1.45

(i) 1.48 (j) 0.08

7. Convert the given percentages into decimals:

(a) 45 % (b) 12 % (c) 78 % (d) 53%

(e) 9% (f) 55% (g) 97% (h) 135 %

(i) 149 % (j) 8%

8. What is the percentage of each of the given condition?

(a) 40 out of 60 (b) 55 out of 100

(c) 11 out of 44 (d) 88 out of 220

9. The present population of a place is 12,300. Among them, 2,500 are adults, 5,500 are youth and 4,300 are children.

(a) What is the percentage of adults?

(b) What is the percentage of children?

(c) Find the percentage of young people.

10. Kabya obtained 60 out of 75 marks in Mathematics in the first terminal examination.

(a) Find the percentage of her marks in Mathematics.

(b) Find, how much mark should she obtain to get 90%?

11. In a school, there are $\frac{3}{4}$ girls.

(a) Find the percentage of girls.

(b) Find the percentage of boys.

(c) Present the percent of the boys and girls into decimal.

Project work

Write name of each of your family members. Among them write the number of males and number of females.

(a) What is the percentage of females?

(b) What is the percentage of males?

(c) Convert the percentage of females and males into decimal and present in classroom.

Mixed Exercise

1. Present 524874509 into place value chart according to national system and write in words.

2. **Present the following numbers into place value chart according to national and international systems. Also, write in words and in expended form too.**

   (a) 123987064 (b) 984321067

3. Write 'seventeen crore sixty five lakh seven thousand four hundred and thirty-two' into numeral and present in place value chart according to national system.

4. Present 452360058 in place value chart according to national and international systems and write in words.

5. Write numeral of 'one hundred seventeen million forty-seven thousand and five hundred twenty-one' and present in place value chart.

6. Round off 78,594 into the nearest hundred and thousand.

7. (a) Write even prime number from 1 to 100.

   (b) Write odd primes from 1 to 100.

   (c) Write composite numbers from 1 to 100.

   (d) How many prime and how many composite numbers are there between 1 to 100?

8. **(a) Simplify:**

   (i) $10 \times 9 + 84 \div 12$ (ii) $44 + 24 \div 3 - 30$

   (iii) $63 \div 9 \times 7 + 4 - 52$ (iv) $6 \times 64 \div 16 + 7 - 21$

   (v) $24 \times 12 \div 12 - 24 + 17$ (vi) $55 \div 11 + 7 \times 3 - 13$

(b) Harilal bought 25 packets of chocolates containing 6 in each packet and one open chocolate on his birthday. Among all the chocolates, if he distributed 90 chocolates to his friends, how many chocolates are there with Harilal now?

9. (a) Identify the improper fraction and mixed number:

(i) $\frac{18}{5}$ (ii) $17\frac{1}{3}$ (iii) $\frac{28}{9}$ -(iv) $7\frac{1}{4}$

(b) Convert the improper fractions into mixed number and the mixed numbers into improper fraction of the questions in 'a' above.

10. **Roshani's Mother gave 3 pieces out of 4 equal pieces of an apple to her brother, Ashish. She gave one whole and a piece out of four equal parts of an apple to Roshani then,**

(a) Write the part of the apple that Ashish ate in fraction. Draw a figure and shade it.

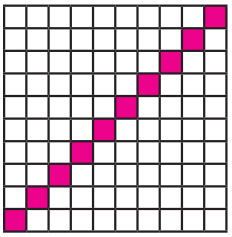
(b) Write the part of the apple that Roshani ate in fraction. Draw a figure and shade it.

(c) Among (a) and (b), which fraction is proper and which is mixed number? Identity.

(d) Express that mixed number into improper fraction.

11. Atul, Devnarayan and Rambinaya went to a fruit shop and bought some oranges. Atul ate 3 and a half, Devnarayan ate 4 and a half and Rambinaya ate 3 oranges. How many oranges did they eat? Calculate.

12. In the given figure,



(a) Write the shaded part in fraction.

(b) Convert the fraction into percentage.

(c) Write the non -shaded part in decimal.

13. In a 55 cm long ribbon, two pieces of length 25.91 cm and 16.28 cm are sold. Find the length of the remaining part.

14. Among 450 students of Sarada Secondary School, 175 are girl students,

(a) Find the number of boys.

(b) Write the number of girls and boys students into fraction and percentage.

15. Ram Naresh bought $10\frac{1}{2}$ meter clothes for his children in Chhat. The elder son, Narendra required $3\frac{1}{2}$ meters for a shirt and pants. The younger son, Saroj required $2\frac{1}{2}$, meters and his daughter Shanta required $3\frac{1}{2}$ meters cloth.

a) How much cloth did all three children require?

b) How much cloth is left to Ram Naresh?

c) If the tailor charges Rs. 500 for each person, find the total cost.

16. Arbinda bought a cake with the weight 1kg and 360g for his birthday. If he divided the cake into 8 equal parts and gave one part to his father,

(a) Write the part of the cake that his father received in fraction.

(b) Write the part of the cake that his father received in percentage.

(c) Find the weight of the cake that his father got.

17. On Saturday, between 11 am to 3 pm, Dolma spent $\frac{1}{8}$ part for homework, $\frac{2}{8}$ to play and $\frac{3}{8}$ sanitation.

(a) How much time is she engaged in from 11 am to 3 pm?

(b) How much time does she have to spare from 11 am to 3 pm? Express in fraction.

(c) What percentage of time did she spend for homework from 11 am to 3 pm time? Find.

18. Shiva sir, gave Rs 60 and Rs. 75 to her son and daughter respectively for lunch from 300 rupees.

(a) What percent of the total amount did he give to his son?

(b) What percent of the total amount did he give to his daughter?

(c) What percent of the total amount did he distribute to his son and daughter?

(d) What is the remaining percent of the total amount that Shiva sir has?

19. There are 50 students on Kamaladevi Basic School in grade 5. Among them, 35 are present,

(a) How many are students absent?

(b) Write the number of both absent and preset students in fraction.

(c) Covert the factions of (b) in percentage and decimal.

(d) What is the sum of the percent of the absent and present students?

20. There are 35 students in Nilakantha Secondary School in grade 5. Among them 14 are girl students.

(a) What is the number of boy students?

(b) Write number of boys in fraction.

(c) Write the number of girls in fraction.

(d) Draw a figure of fraction that represents girls and boys. Show it by colouring the figure.

(e) Write the type of fraction formed; proper, improper or mixed number.

(f) What is the percent of the girls and boys in the school?

21. The distance from Butwal to Umesh's house in Arghakhachi is 115km. Umesh travelled 80km and 500 m black topped road by bus. He travelled 30 km and 750 m dirt road on a motorbike and remaining road on foot.

(a) What distance did Umesh travell on foot?

(b) If the speed of the motorbike is 250 m per minute, how long did Umesh travel on the motorbike?

(c) If the bus travelled 500 meter in one minute, what time did Umesh spent in the bus?

(d) If Umesh's speed on foot is 40 m per minute, find the total time taken to reach Arghakhachi from Butwal.

Lesson 8

Time

8.0 Review

Discuss the following questions in groups:

विक्रम संवत् २०७९	नेपाल संवत् ११४१	असोज September/October 2022				
आइतबार Sunday	३० 16 षष्ठी	२ 18 अष्टमी	९ 25 औंसी	१६ 2 प्रथमा	२३ 9 तृतीया
सोमबार Monday	३१ 17 सप्तमी	३ 19 नवमी	१० 26 औंसपछि प्रतिपदा	१७ 3 अष्टमी	२४ 10 औंसपछि प्रतिपदा
मङ्गलबार Tuesday		४ 20 दशमी	११ 27 द्वितीया	१८ 4 नवमी	२५ 11 द्वितीया
बुधबार Wednesday		५ 21 एकादशी	१२ 28 तृतीया	१९ 5 दशमी	२६ 12 तृतीया
बिहीबार Thursday		६ 22 द्वादशी	१३ 29 चतुर्थी	२० 6 एकादशी	२७ 13 चतुर्थी
शुक्रबार Friday		७ 23 त्रयोदशी	१४ 30 पञ्चमी	२१ 7 द्वादशी	२८ 14 पञ्चमी
शनिबार Saturday	१ 17 सप्तमी	८ 24 चतुर्दशी	१५ Oct.1 षष्ठी	२२ 8 त्रयोदशी	२९ 15 षष्ठी

(a) What time is it in the first clock?

(b) What time is it in the second clock?

(c) How many small lines are covered by the minute hand when the second hand complete one turn?

(d) How many cycles will be covered by the second hand when the minute hand complete one turn?

(e) Which n^{th} month is Ashoj according to Nepali Calendar?

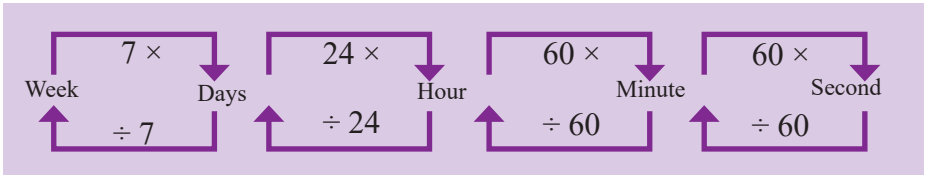
(f) How many days are there in a month?

(g) How many weeks and days are there in the given calendar?

(h) How much should be added in 3 years and 6 months to make 6 years and 7 months?

(i) What are the units of time?

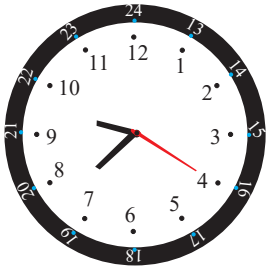
One week = 7 days 1 day = 24 hours 1 hour = 60 minutes 1 minute = 60 seconds	1 year → 365 days 1 year → 52 weeks 1 year → 12 month



8.1 Time in 12 hours and 24 hours system

Activity 1

Observe the given two clocks and table. In the first clock, there are numbers up to 12 and in the second clock, there are numbers up to 24. Based on these two watches, how can we write the time format of 12 hours and 24 hours? Discuss in groups and complete the following table.

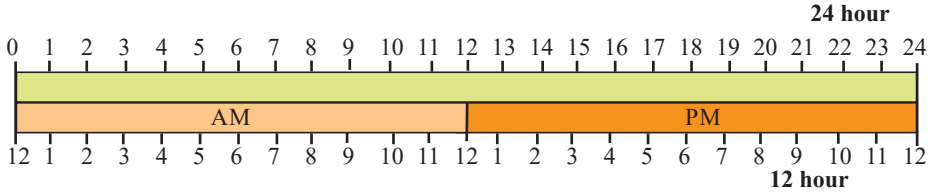


12 hours	24 hours
12:00 midnight or 0:00	24:00 midnight or 0:00
1:00 AM	1:00
2:00 AM	2:00
3:00 AM	3:00
4:00 AM	4:00
5:00 AM	5:00
6:00 AM	6:00
7:00 AM	7:00
8:00 AM	8:00
9:00 AM	9:00
10:00 AM	10:00
11:00 AM	11:00
12:00 PM	12:00
1:00 PM	13:00
2:00 PM	14:00
3:00 PM	15:00
4:00 PM	16:00
5:00 PM	17:00
6:00 PM	18:00
7:00 PM	19:00
8:00 PM	20:00
9:00 PM	21:00
10:00 PM	22:00
11:00 PM	23:00
12:00 PM	24:00

The time from 12 midnight to 12 noon is called ante meridiem. It is denoted by AM.

The time from 12 noon to 12 midnight is called post meridiem. It is denoted by PM.

We know that there are 24 hours in a day. We can show 12 hours system of time in AM and PM as in the following figure.



Example 1

An airplane took off for Japan from Nepal according to the first clock. And, it reached Japan according to the second clock. Express the time of Japan in 24 hour system. Find the time that the plane took to reach Japan form Nepal.

AM

PM

Solution

Here, the time of take off for Japan = 50 past 8.

According to 12 hour system, we write it as 8:50 AM and according to 24 hour system we write 8:50 AM = 8:50

[Before 12 o'clock, we take same time and remove AM]

Again, the time the plane reached Japan = 30 past 3 in afternoon.

In 12 hour system, we write it as 3:30 PM and in 24 hour system,

3:30 PM = 3:30 + 12:00 = 15:30 [Add 12 and remove PM]

The time taken by the plane to reach Japan = 15:30 – 8:50

= 6:40 hours

Therefore, the plane took 6 hour and 40 minutes to reach Japan.

8.2 Multiplication and Division of Time

Activity 2

Study the following conditions. Discuss the given questions in pairs and present in classroom.

In Annapurna Foot Trek, the trekking team led by Hillary walked 5 hours and 30 minutes each day.

(a) If the rate is same for each day, how much time will they walk in 3 days?

(b) How many hours will they walk in a week if they walk at the same rate each day?

(c) If they walk 5 km daily on average, how much time will they take to walk 1 kilometer?

(d) If they have to cover 6 kilometers each day with the same rate, how many hours will they have to walk per day?

Example 2

Sajan spends 2 hours and 15 minutes doing homework every day. In the same rate, how much time will he spend in 5 days for homework?

Solution

Here, the time spent by Sajan for homework is 2 hours and 15 minute

Hours	Minutes
2	15
	× 5
10	75
+ 1	–60
11	15

Hence, Sajan spends 11 hours and 15 minute in 5 days for homework.

Example 3

A swimmer practises for 4 hour and 25 minute each day. How much time will he practise in five days?

Solution

Here,

Hours	Minutes	
4	25	
	× 5	
20	125	
+ 2	–120	[1hour = 60 min]
22	5	

Hence, the swimmer spends 22 hours and 5 minutes for practise in 5 days.

Example 4

Multiply 5 years and 9 months by 6:

Solution

Here,

years	months
5	9
	× 6
30	54
+ 4	– 48
34	6

[54 month = 4 year + 6 months]

34 years 6 month

Example 5

A tractor takes 8 hours and 17 minutes to plough 7 Bigha of field. How much time will it take to plough 1 Bigha of field?

Solution

Here,

Hour	Minute
1	11
7) 8	17
– 7	
1	17
	77
	– 7
	7
	– 7
	0

1 hour = 60 minutes
60 +17 = 77 minutes

Example 6

Divide 21 years and 4 months by 8.

Solution

Year	Month
2	8
8) 21	4
– 16	
5	4
	64
	– 64
	0

1 year = 12 months, 5 years = 60 months, 60 + 4 = 64 months

Example 7

Sujata takes all the classes of seven subjects. If the duration of each class is 50 minutes, find the total time in housrs and minutes that she spends each day.

Solution

Here, the time of the class of a subject = 50 minutes.

The time for all the classes of 7 subjects = 7 × 50 minutes = 350 minutes.

Here, 1 hour = 60 minutes

By converting 350 minutes into hour,

350 minute = 300 + 50 minutes

= 5 hours and 50 minutes

Hence, Sujata takes 5 hour and 50 minutes classes.

5
60) 350
– 300
50

Exercise 8.1

1. Convert:

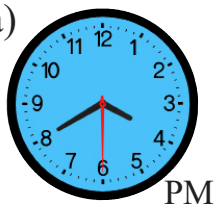
(a) 5 hour and 20 minutes to minute

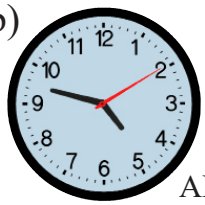
(b) 10 hours and 15 minutes to minute

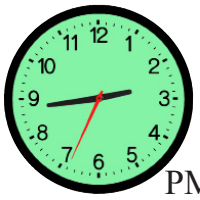
(c) 8 hours and 40 minutes to hour

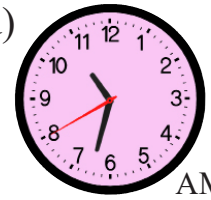
(d) 6 hours and 50 minutes to hour

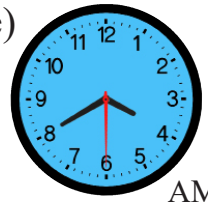
2. Observe the following clocks and write time in 24 hour format.

(a) 

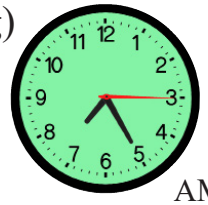
(b) 

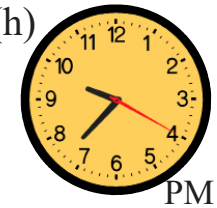
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

3. Write the 12 hour format of time into 24 hour format of time.

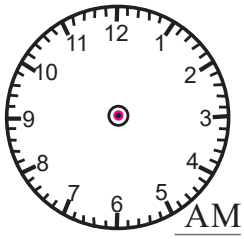
12 hour time	24 hour time		12 hour time	24 hour time
3:25 AM	3:25		3:25 PM	15:25
7:20 AM			7:20 PM	
9:30 AM			9:30 PM	
11:44 AM			11:44 PM	
3:29 AM			3:29 PM	
5:45 AM			5:45 PM	
10:39 AM			10:39 PM	

4. Write the 12 hour format of time into 24 hour format of time.

24 hour time	12 hour time		24 hour time	12 hour time
13:25	1:25		6:25	6:25
7:20			17:20	
19:30			14:33	
11:44			11:44	
23:29			3:29	
15:45			22:45	
2:39			10:39	

5. Construct minute and hour hands in the given clocks according to the given time. Also write the time in AM or PM in the clocks.

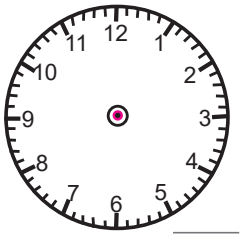
(a)



AM

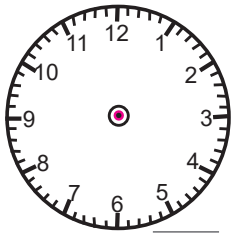
06:25

(b)



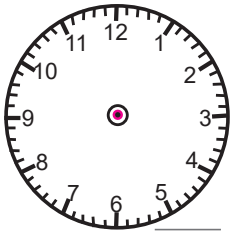
14:50

(c)



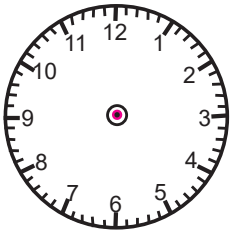
00:15

(d)



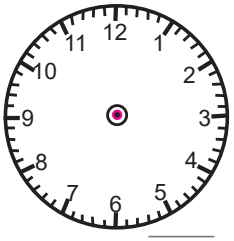
18:05

(e)



22:20

(f)



15:55

6. Multiply:

(a) 3 years and 7 months by 6

(b) 8 years and 9 months by 8

(c) 12 days and 15 hours by 3

(d) 11 days and 13 hours by 5

(e) 12 hours and 21 minutes by 3

(f) 4 hours and 40 minutes by 5

(g) 5 weeks and 4 days by 8

7. Divide:

(a) 13 years and 6 months by 3

(b) 18 years and 1 month by 7

(c) 22 days and 12 hours by 4

(d) 25 days and 8 hours by 8

(e) 32 hours and 20 minutes by 5

(f) 19 hours and 36 minutes by 6

(g) 27 weeks and 3 days by 8

8. Sailesh is studying in grade 5 in a school of his village. Since he has to go up hill, it takes 1 hour and 25 minute to reach school and 1 hour and 5 minute to return home. How much time will he spend on the way in six days?

9. It takes 12 hours and 36 minutes for Shyam to circle 5 rounsd of a circular tea garden. How much time does it take for him to circle the garden once?

10. Bimala started her homework at 6:30 AM and completed at 8:15 AM.

(a) How much time she spend doing homework?

(b) Convert that time into minutes.

(c) Convert that time into seconds.

11. Hari runs 45 minutes every morning. How much time does he spend in a week in hours and minutes?

12. It takes 2 hours and 20 minutes to fill a water tank. How much time is required to fill the same type of 5 water tanks?

13. A school runs for 6 hours each day. Among that, 10 minute is for assembly, 30 minute is for interval. If 8 classes run each day, what will be the length of each class?

14. Some workers can construct one kilometer road in 4 months and 12 days. How much time will they require to construct 5 kilometers of a road?

15. It takes 2 and half hours to plant potato in a filed. What time will it require to plant potato in the field having 7 times more area than the previous one?

16. Shiva, Ganesh and Aitaman each worked 3 weeks and 4 days to construct a road. How many days did each of them work in total?

Project work

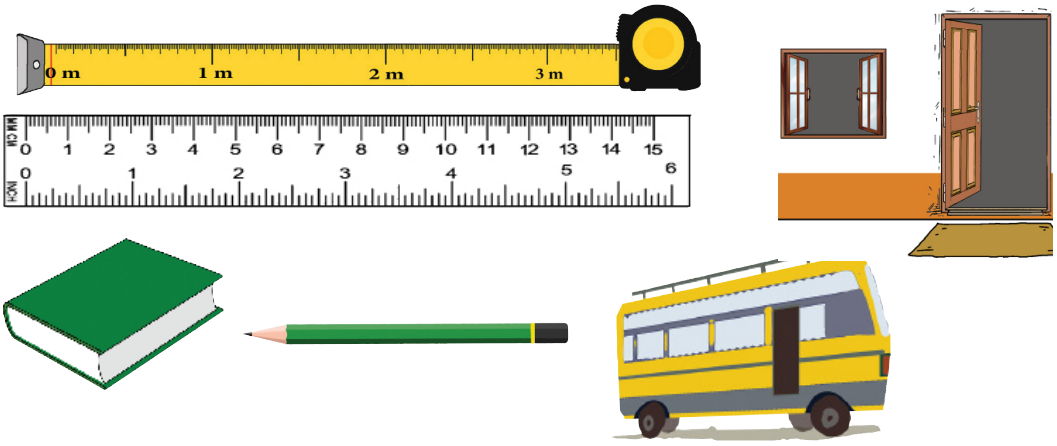
List all the activities you do between the time you get up and you go to school on sunday. Write the time required for each activity. If you are supposed to do the same activities in the same way, calculate the total time for each activity for a week except for Saturday.

Lesson 9

Distance

9.0 Review

Discuss the given questions in groups.



(a) What are the tools that are used to measure the length of the given objects?

(b) What will be the units to measure the length of the given objects?

(c) Estimate then measure the length and breadth of your Mathematics book.

(d) In which measurement unit did you measure the length & breadth of your book?

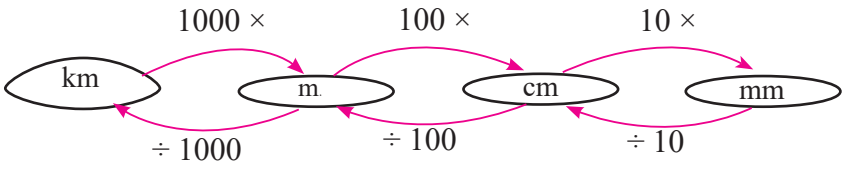
(e) What is the total length of each sides of your book?

(f) How many millimeters are there in 1 centimeter?

(g) How many centimeters are there in 1 meter?

(h) How many meters are there in 1 kilometer?

To convert from larger units to smaller units we have to multiply.
To convert from smaller units to larger units we have to divide.

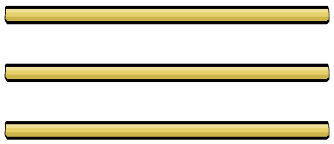


9.1 Multiplication and Division related to Millimetre and Centimetre, Centimetre and Metre, Metre and Kilometre

9.1.1 Multiplication and Division related to Millimetre and Centimetre

Activity 1

(a) Work in pair and take three equal pieces of small wooden sticks.



(b) One should measure the length of a stick by using a ruler and write in your exercise book.

(c) Multiply the length obtained by 3.

(d) The other sould join all the three sticks by their ends and measure the length and write in your exercise book.

(e) Compare the result of both the members and discuss in pair and generalize the result.

Activity 2

(a) Take a paper strip. Measure the length of that paper strip in cm and mm and write it in an exercise book.

(b) Fold the paper strip at the middle such that it will divided into two equal parts. Again, fold it and we can get 4 equal pieces of paper strips.

(c) Now, measure a strip. Is the length of the strip equal to the quotient of the length obtained by dividing the whole length bye or not? of whole length of strip by 4 or not?

Example 1

If pieces of ribbons of 22 cm and 7 mm have to be given to 5 persons each, how much ribbon is needed?

Solution

cm	mm	
22	7	
	× 5	
110	35	
+ 3	–30	[∵ 30 mm = 3 cm]
113	5	

Hence, 1 meter, 13 centimeter and 5 millimeter ribbon is required.

Example 2

How long ribbon will each person obtain if 58 cm and 8 mm long ribbon is distributed equally to 3 persons?

Solution

Here, to distribute 58 cm and 8 mm ribbon to 3 people means it is divided into 3.

	cm	mm
	19	6
3)	58	8
	− 3	
	28	
	− 27	
	1	8
		18
		− 18
		0

1 cm = 10 mm
10 + 8 = 18 mm

Hence, each person gets 19 cm and 6 mm ribbon.

9.1.2 Multiplication and Division Related to Centimetre and Meter

Activity 3

(a) In groups measure and write the length of your classroom with a meter tape.

(b) What shoud we do to calculate the length of 3 equal sized rooms.

(c) Multiply the length of that room (in b above) by 3 and write in meters and centimeters. Compare yout results with that of you friends..

(d) Now, divide the quotient by 3. What's the result? Discuss.

Example 3

A person requires 1 m 20 cm cloth to make pants. How much cloth is required for 6 same-size pants?

Solution

Here, a person requires 1 m and 20 cm cloth to make pants.
Total clothes required to make such 6 pants is,

Meter	Centimeters
1	20
	× 6
6	120
+ 1	–100
7	20
7 m.	20 cm

100 cm = 1 meter

Example

A sugarcane of length 2 m and 80 cm is divided by 4 persons equally. What is the length of the sugarcane each person eats?

Solution

Here, dividing 2 m and 80 cm long sugarcane to 4 persons means, the length is divided by 4.
2 m and 80 cm = 200 cm + 80 cm = 280 cm

$$
\begin{array}{r|l}
 & 70 \\
\hline
4 & 280 \\
 & -28 \\
\hline
 & 0 \\
 & -0 \\
\hline
 & 0
\end{array}
$$

1 m = 100 cm

Hence, each person ate 70 cm of sugarcane.

9.1.3 Multiplication and Division related to Meter and Kilometre

Activity 4

Alina Shakya went to visit Sauraha in Dashain vacation with her friends. The bus takes 5 hours to cover the 142 km and 600 meter distance from Kathmandu to Saurha.

(a) How much distance did they travel two way from Kathmandu to Sauraha?

(b) If Alina went Sauraha with her parents next time, how much distance did she travelled in two occasions?

(c) How much distance did the bus covered in one hour if it takes 5 hour to cover 142 kilometers and 600 meters?

Example 5

A person travels 3 km and 145 m distance in 1 hour. How much distance will he travel in 7 hours?

Solution

km	centimeter
3	145
	× 7
21	1015
+ 1	– 1000
22	15

Hence, 22 km and 15 m.

Example 6

In a relay race of 7 km and 200 m, 6 players completed the race. If each person ran equal distance, find the distance covered by each player.

Solution

To find the distance covered by 6 individual player in a 7 km and 200 meter relay race, we have to divide it by 6 to get the distance covered by a single player.

$$
\begin{array}{r|ll}
 & \text{km} & \text{m} \\
 & 1 & 200 \\
\hline
6 & 7 & 200 \\
 & -1 & \\
\hline
 & 1 & 200 \\
\hline
 & & 1200 \\
 & & -1200 \\
\hline
 & & 0
\end{array}
$$

1 km = 1000 m

Hence, one player ran 1 km 200 m.

Exercise 9

1. **Convert:**
   - (a) 3 cm and 7 mm to mm
   - (b) 70 cm to mm
   - (c) 12 m 45 cm tocm
   - (d) 2700 cm to m
   - (e) 12 km 210 m to m
   - (f) 67000m to km
2. **Multiply:**
   - (a) 5 cm 7 mm by 6
   - (b) 7 cm 3 mm by 7
   - (b) 12 m 45 cm by 5
   - (d) 21 m 43 cm by 4
   - (e) 4 km 620 m by 8
   - (f) 9 km 425 m by 9
3. **Divide**
   - (a) 16 cm 5 mm by 5
   - (b) 27 cm 2 mm by 8
   - (c) 22 m 20 cm by 6
   - (d) 56 m 21 cm by 11
   - (e) 12 km 330 m by 9
   - (f) 64 km 680 m by 7

4. The length of a ball pen is 14 cm 7 mm. What is the total length of 5 similar ball pens if they are joined?

5. The length of a book is 24 cm and 8 mm. What is the total length of such 4 books?

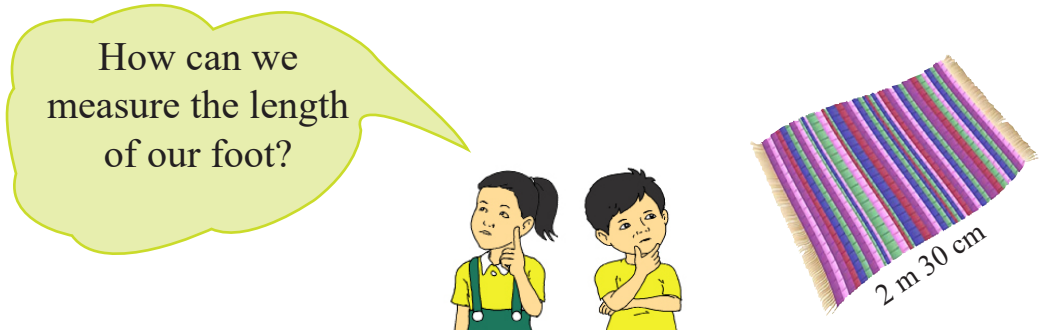
6. A sugarcane is consumed by 5 person equally. If a person ate 50 cm length of sugarcane, find the total length of the sugarcane.

7. Abdul walks 1 km 500 m in the morning walk. How much distance does he cover in one week?

8. A road of length 16 km and 800 metres needed to be blacktopped. It was divided into 3 equal parts was given to 3 contractors. How much distance is received by a contractors?

9. The thickness of a book is 1 cm 4 mm. What will be the total thickness of such 15 books?

Project work



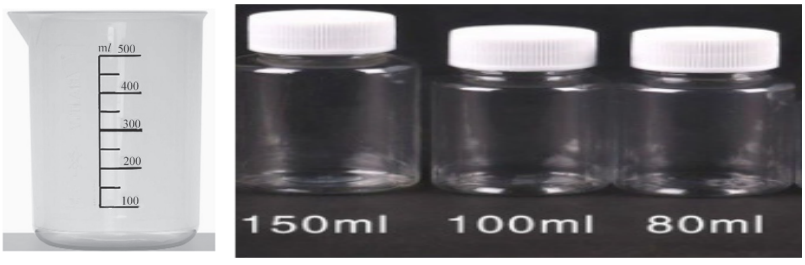
The above figure shows that your friend is thinking about how to measure the length of her feet. If you have a mat of 2 m 30 cm, suggest to your friend to measure the length of her foot without measuring it with a tape. Demonstrate this activity in the classroom.

Lesson 10

Capacity

10.0 Review

Discuss the following questions in groups:



(a) We can find the capacity of each pot with the help of their written capacity lebels. What are the capacities of the bottle, jug and tanks given in the figure?

(b) Are there any utensils at your home to denote the capacity?

(c) How much water will all the utensils above contain in total?

(d) What is the difference of the two larger capacity utensils?

(e) What is the difference between the largest and the smallest capacity utensils?

10.1 Multiplication and Division related to Millilitre and Litre

Activity 1

(a) Collet the utensils figure available in your school.

(b) If turn, fill the small utensils with water and pour it into larger utensils. Observe how much water of the small utensil is contained in them.

c) How much water will be there if 3 times of 1 liter and 200 milliliter bottles poured in a bucket?

d) How many times do we have to pour water from a 5 liter bucket to a jar to fill it?

e) In turn, conduct more similar activities by discussing with friends.

Example 1

There are 6 members in Apsara's family. Each member drinks 225 ml of milk daily. How much milk do they have buy each day?

Solution

Here each person needs 225 *ml* of milk.

We have to find the required milk for 6 members. So, we have to multiply 225 by 6.

$$\begin{array}{r} 225 \text{ m}l \\ \times\ 6 \\ \hline 1350 \text{ m}l \end{array}$$

1350 m*l* = 1000 m*l* + 350 m*l* = 1 l 350 m*l*

Hence, *1* liter and 350 ml of milk is required for Apsara's family each day.

Example 2

Multiply 12 *l* and 350 m*l* by 7:

Solution

Here,

l	m*l*
12	350
×	7
84	2450
+2	–2000
86	450

Hence, it is 86 liter and 450 milliliter.

Example 3

How much milk will each person get if 14 liter and 760 milliliter of milk is divided equally among 6 people?

Solution

Here,

l	m*l*
2	460
6) 14	760
– 12	
2	760
	2760
	– 24
	36
	– 36
	0
	– 0
	0

2 *l* = 2000 m*l*

2000+ 760 = 2760 m*l*

Example 4

A drink of 8 liter 500 milliliter is distributed equally to workers harvesting paddy. If each worker gets 500 ml of drinks, find how many workers are there?

Solution

Here total drinks = 8 liter and 500 milliliter

= (8×1000 +500) milliliter

= 8000 +500 milliliter

= 8500 milliliter

Drinks obtained by one worker = 250 m*l*.

Therefore,

Total number of workers = $\frac{8500}{250}$

$= \frac{850}{25}$

$$
\begin{array}{r}
34 \\
\hline
25 \overline{)\ 850} \\
-\ 75 \\
\hline
100 \\
-\ 100 \\
\hline
0
\end{array}
$$

Therefore, total number of workers = 34

Exercise 10

1. Convert:

(a) 3 *l* 200 m*l* to m*l*

(b) 15 *l* 250 m*l* to m*l*

(c) 47000m*l* to *l*

(d) 65450 m*l* to *l*

(e) 12425 m*l* to *l* and m*l*

2. Multiply:

(a) 4 *l* and 300 m*l* by 3

(b) 14 *l* 450 m*l* by 4

(c) 20 *l* 250 m*l* by 10

(d) 42 *l* 125 m*l* by 9

e) 50 *l* 375 m*l* by 8

3. Divide:

(a) 10 *l* 500 m*l* by 3

(b) 17 *l* 640 m*l* by 8

(c) 47 *l* 425 m*l* by 5

(d) 26 *l* 760 m*l* by 8

(e) 12 *l* 330 m*l* by 9

4. A small bottle contains 250 *ml* of juice. How many such bottles are required to put 2 liters of juice?

5. Tea has to be distributed to 15 people; 200 *ml* each. What capacity kettle schould be used to bring the required amount of tea at once?

6. There are 20 packets in a cartoon of mustard oil. If a packet of oil contains 500 *ml*, how much oil is there in a cartoon? Calculate in liter and milliliter.

7. Sunita filled a gallon by pouring 10 time with a jug of 1.5 liters. How much water is confained by the gallon?

8. There is juice in a jung. Shanta filled 8 cups with 350 ml juice each. Still, 200 *ml* is left in the jug. Find the total capacity of the jug.

9. A doctor prescribed a medicine of 150 *ml* for a gastritis patient. He suggested the patient to take 10 *ml* once, 3 times a day. How many days will the medicine be sufficient for the patient?

10. In a marriage party eachjanti (guest) is served with 300 *ml* of Lassi. There were 150 guest in total. How many liters of Lassi did they take?

Project work

List 5 different utensils or bottles from your home. Find their capacity. Complete the following table and present in the classroom.

Name of Utensil	Capacity (liter)	Capacity (Milliliter)
Pressure cooker	2.5 *l*	2500 m*l*

Lesson 11

Weight

11.0 Review

Phulmaya bought the following vegetables for her son Ramnarayan's birthday party:

S.N.	Particulars	Quantity
1.	Potato	5 kg
2.	Bitter gourd	1 kg
3.	Cauliflower	4 kg
4.	Onion	500 g
5.	Tomato	750 g

Discuss the following questions based on the above table:

(a) How much vegetables did the mother buy?

(b) How much less kilogram of bitter gourd was bought than potato?

(c) How much onion should be added to make the weight equal to tomato?

11.1 Multiplication and Division Related to Gram and Kilogram

Activity 1

Rita bought 3 metal pots (Karahi) and 5 bronze plates for the kitchen. The weight of a pot put is 1 kg 800 g and that of 5 plates is 8kg 500 gm. Discuss on following questions and conclude:

(a) What is the total weight of 3 pots?

(b) What is the weight of a bronze plate?

(c) What is the total weight of 3 pots and 5 bronze plates?

(d) Among a pot and a plate which is heavier an by how much?

Here, the weight of a pot is 1kg 800g. Now, we have to find the total weight of 3 pots.

Therefore,

kg	g
1	800
	× 3
3	2400

3 kg + 2 kg 400 g = 5 kg 400 g

Likewise, the total weight of 5 bronze plates is 8 kg and 500 g. So, to find the weight of a plate, we have to divide.

Therefore, 8 kg 500 g = 8500 g

$$
\begin{array}{r|l}
 & 1700 \\
5 & 8500 \\
 & -5 \\
 & 35 \\
 & -35 \\
 & 0 \\
 & -0 \\
 & 0 \\
 & -0 \\
 & 0
\end{array}
$$

Hence, the weight of a plate is 1700 g. We can express it as 1 kg and 700 g.

Example 1

The weight of a metal pot in a shop is 2 kg 425 g. What will be the total weight of 8 similar pots?

Solution

Here,

kg	g
2	425
×	8
16	3400
+3	–3000
19	400

3000 g = 3 kg

Hence, the total weight of 8 metal pots is 19 kg 400 g.

Example 2

5.6 kg of roasted chickpeas to be sold was packed in 28 packets of equal weight. Find the weight of a single packet.

Solution

Here, roasted chickpeas = 5.6 kg

$= 5.6 \times 1000 = 5600$ g

To make 28 packets of chickpeas from 5600gm

$$\begin{array}{r|l} & 200 \\ \hline 28 & 5600 \\ & -56 \\ \hline & 0 \\ & -0 \\ \hline & 0 \\ & -0 \\ \hline & 0 \end{array}$$

[1 kg = 1000g]

[5.6 kg = 5000+600 = 5600g]

Hence, the weight of a packet of chickpeas is 200 g.

Example 3

How much fruit will a person get if 17 kg 640 g of fruit is divided equally among 8 people?

Solution

Here, the weight of fruit = 17 kg 640 g

	kg	g
	2	205
8)	17	640
	– 16	
	1	640
		1640
		– 16
		4
		– 0
		40
		– 40
		0

1 kg = 100 g,
1000 + 640 =1640 g

11.2 Multiplication and Division Related to Kilogram and Quintal

Activity 2

Suman and Ritesh were going to school. They saw a truck loaded with food stuff.

They went close to the driver and asked.

Suman : Listen please! What is the truck carrying?

Driver : Here are sacks of rice in this truck. The weight of a sack is 25 kg. Here are 200 packets in total.

(They went to school after talking to the driver)

Suman : Oh! That truck was carriying 5000 kg of rice. Ritesh, do you know how many quintals are there in 5000 kg?

Ritehsh : I know Suman, we have learned it in grade 4.

1000 kg is equal to 1 quintal. Therefore, 5000 kg is equal to 50 quintals. Suman, how much load will seven such trucks with the same load can carry?

Suman : Ah, Ritesh ! The total weight of seven such trucks is equal to seven times ofthe weight of a truck. Therefore, $50 \times 7 = 350$ quintal.

Ritesh : Suman, if 8 shopkeepers equally brought all the rice of this truck, how muny quintals does a shopkeeper get?

Suman : Look, Ritesh, we have to divide for equal distribution. Here, when 50 quintal is divided by 8, we get 6.25 quintal. We say it as 6 quintal and 25 kg.

Ritesh: Suman, lets ask and discuss with the teacher in the class tomorrow whether or not our calculation is true.

(Next day Suman and Ritesh described their previous day's discussion to their teacher.)

Teacher: Yes. The things that you discussed yesterday are all correct. Please, discuss other subject matters continuously.

Example 4

How many kilograms are there in 15 quintal and 32 kg?

Solution

Here, 15 quintal = 15×100 kg = 1500 kg

Now, 15 quintal 32 kg = (1500 + 32) kg = 1532 kg.

[15 quintal = 1500kg]

Example 5

Multiply 8 quintal 40 kg by 8.

Solution

Here,

Quintal	kg
8	40
×	8
64	320
+ 3	–300
67	20

300 kg = 3 quintal

Hence, 8 quintal 40 kg multiplied by 8 is equal to 67 quintal 20 kg.

Example 6

Divide 73 quintal 89 kg by 9.

Solution

Here,

Quintal	kg
8	21
9) 73	89
– 72	
1	89
	189
	– 18
	9
	– 9
	0

1 quintal = 100 kg
100 + 89 gram = 189 kg

Hence, 73 quintal 89 kg divided by 9 is equal to 8 quintal and 21 kg.

Exercise 11

1. Convert:

(a) 5 kg 300 g to g
(b) 39000 g to kg
(c) 35457 g to kg and g
(d) 12 quintal to kg
(e) 700 kg to quintal

2. Multiply:

(a) 2 kg 350 g by 3
(b) 6 kg 720 g by 6
(c) 21 kg 72 g by 10
(d) 25 kg 150 g by 8
(e) 12 quintal 30 kg by 9
(f) 20 quintal 56 kg by 7

3. Divide:

(a) 3 kg 650 g by 5
(b) 12 kg 420 g by 9
(c) 9 kg 300 g by 6
(d) 34 kg 133 g by 11
(e) 16 quintal 35 kg by 5
(f) 25 quintal 68 kg by 12

4. A carton of noodle contains 30 packets of noodles. The weight of a packet of noodle is 75 g and the weight of the empty carton is 170 g. Find the total weight of the carton including noodles.

5. The weight of a cup is 350 g.

a) What is the weight of 15 such cups?
b) How many cups weigh 3.15 kg?

6. The weight of an inkpot is 270 gram.

(a) What is the weight of 14 such inkpots?
(b) How many inkpots weigh 5.4 kg?

7. 15.6 kg of beaten rice is equally distributed among 30 students. How much beaten rice did each student get?

8. A container contains 236 powder bottles. The weight of a powder bottle is 1.3 kg and the weight of the empty container is 3 quintal. Find the total weight of the container including the weight of the powder.

9. A sack of salt contains 50 packets. The weight of a packet is 1 kg.

(a) What is the weight of the sack of salt?

(b) How many packets of salt are there in 2 quintals?

10. $5\frac{1}{4}$ kg of grapes is distributed equally among 25 persons.

(a) How much grapes did each person get?

(b) Convert $5\frac{1}{4}$ kg into gram.

(c) If $5\frac{1}{4}$ kg grapes are distributed among 30 persons equlals how much does each person get?

11. 5 people stored equal amount of potato in a cold store. If they stored 2.5 quintal of potato, how many quintal did each person store?

12. Sugar is distributed as relief for 200 persons by using a jug of 2.5 kg capacity. How many quintals of sugar was distributed in total?

13. 11 kg of dry food is distributed to the students of an educational tour as snacks. If 50 students ate the snacks, find what amount of dry food each student got.

Project work

1. Identify and write the weight of 5 different things, that are brought from bazaar, yourself or with the help of your parents. Write the weight and present it in the classroom.

Name of things	Weight (kg)	Weight (g)
Potato	2 kg	200 g

2. Fill 5 different bags of plastic with soil or sand. Perform the following activity and present your report with your experience in classroom.

(a) Estimate the weight of bags containing sand. Find the accurate weight by using digital balance.

(b) What is the difference between your estimate and the accurate weight?

(c) What is the total weight of all the filled bags?

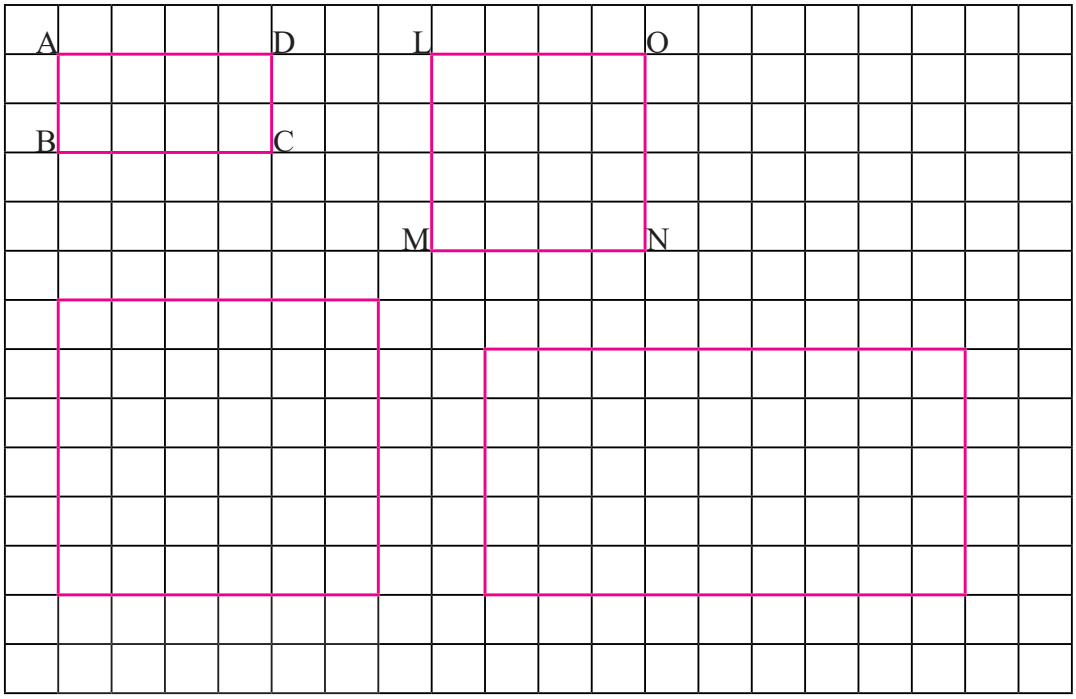
(d) If the weight of all bags was same, how would you calculate the total weight and why?

Lesson 12

Perimeter, Area and Volume

12.0 Review

Observe the rectangles and squares that is drawn on square grid using different colours and discuss the following questions.



a) What is the perimeter of each rectangle and square given above? Find it by counting the squares.

b) What is the area of each rectangle and square given above? Find it by counting the squares.

c) If the length of a square is 1 cm, then what will be the perimeter and area of each shapes?

12.1 Perimeter, Area and Volume

12.1.1 **Perimeter**

Activity 1

How can we find the perimeter of the given rectangles? Discuss in pairs and draw conclusions.

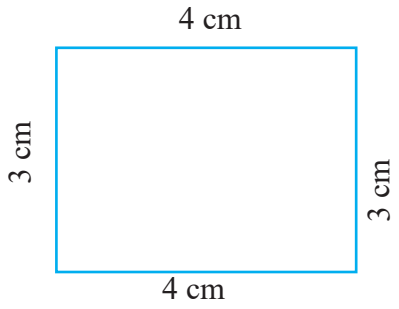


Figure (A)

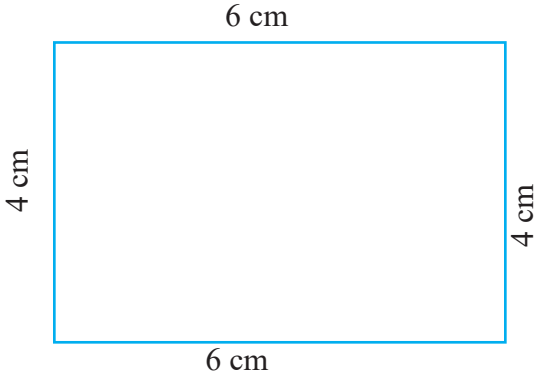


Figure (B)

We have already learned to find the perimeter of rectangular and square surfaces by counting squares 1 unit. Based on idea we have let's calculate perimeter of the given rectangles.

Length and breadth of the rectangle is given in cm on figure (A) and (B). So, as given in the figure below, draw squares with 1 cm length on length and breadth of the rectangle.

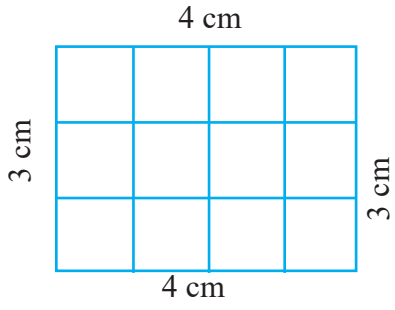


Figure (A)

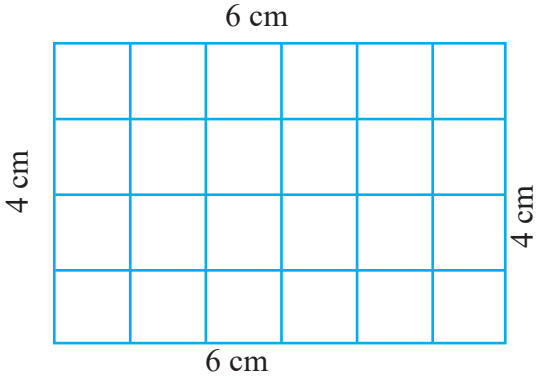


Figure (B)

Now, calculate perimeter by counting number of squares with 1 unit lenght.

In figure (a),

Number of squares with 1 unit lenght on the length side = 4

Number of squares with 1 unit length on the breadth side = 3

Perimeter = 4 + 3 + 4 + 3 = 14 cm (Since, length of a square is 1 cm)

In figure (b),

Number of squares with 1 unit length on the length size = 6

Number of squares with 1 unit length on the breadth size = 4

Perimeter = 6 + 4 + 6 + 4 = 20 cm (Since length of square is 1 cm)

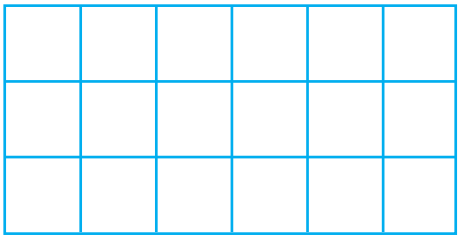
Now, let's see the relation between length, breadth and perimeter from the above discussion.

Figure	Length	Breadth	Perimeter	Relation
(a)	4 cm	3 cm	14 cm	$2 \times 4 + 2 \times 3 = 14$
(b)	6 cm	4 cm	20 cm	$2 \times 6 + 2 \times 4 = 20$
Conclusion: We can find the perimeter of a rectangular surface by adding two times length and two times breadth. The perimeter of a square surface is four times the length.				

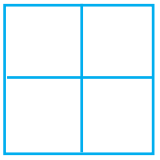
Example 1

Find the perimeter of the given shapes by counting the squares. The length of a square is 1cm.

(a)



(b)



Solution

(a) Here,

Number of squares with 1 unit length on the length side = 6

Number of squares with 1 unit length on the breadth side = 3

Perimeter of rectangle = ?

Perimeter of rectangle = 6 + 3 + 6 + 3 = 18 cm

Alternative method,

Perimeter of rectangle = 2 × Number of squares with 1 unit length on the length + 2× Number of squares with 1 unit length on the breadth side.

$= 2 \times 6 + 2 \times 3 = 12 + 6 = 18$ cm

(b) Here,

Number of squares with 1 unit length on the square's length side = 2

Perimeter of the square =?

Perimeter of the square = 2 + 2 + 2 + 2 = 8 cm

Alternative method,

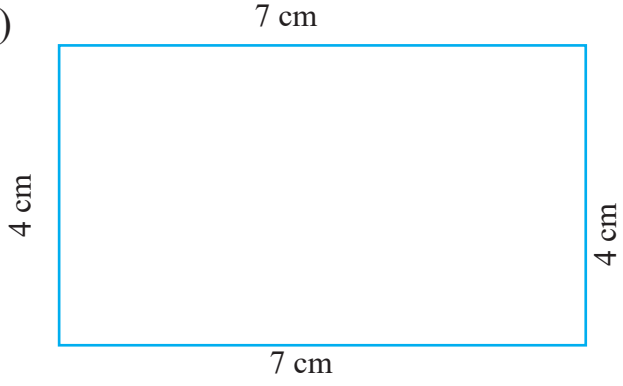
Perimeter of the square = 4 × Number of squares with 1 unit length on the length side.

$= 4 \times 2 = 8$ cm

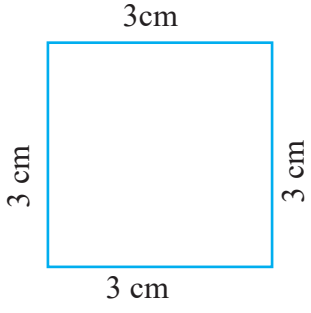
Example 2

Find the perimeter of the given shape based on length and breadth.

(a)

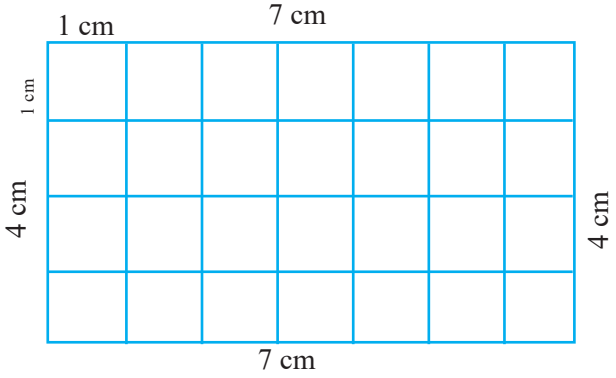


(b)



Solution

(a) Here, drawing the squares having 1 cm length on the given shape,



Now, number of squares with 1 unit lenght on the rectangle's length side = 7

Number of squares with 1 unit length on the rectangle's breadth side = 4

Perimeter of the rectangle = ?

Perimeter of rectangle = 2 × Number of squares with 1 unit length on the length side + 2 × Number of squares with 1 unit length on the breadth side = 2 × 7 + 2 × 4 = 14 + 8 = 22 cm

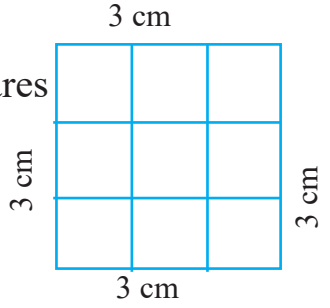
(b) Here, drawing the squares having 1 cm length on the given shape,

Now, Number of squares with 1 unit length on the square's length side = 3

Perimeter of the square = ?

Perimeter of square = 4 × Number of squares with 1 unit length on the length side

= 4 × 3 = 12 cm



12.1.2 Area

Activity 2

How can we find the area of the given rectangle? Discuss in pairs and draw conclusions.

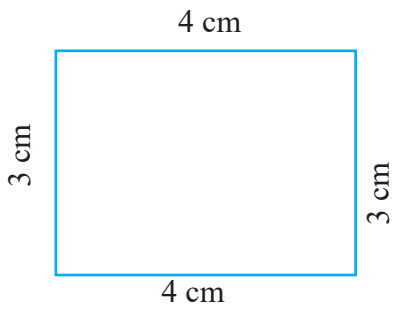


Figure (A)

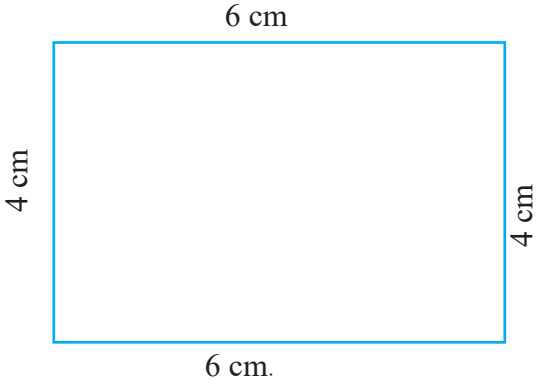


Figure (B)

We have already learned to find the area of rectangular and square surfaces by counting square with 1 unit length. Based on previous experiences, let's calculate the area of the given rectangles.

Length and breadth of the rectangle is given in cm in the figure (A) and (B). So, as given in the figure below, draw squares with 1 cm sides on length and breadth of rectangle.

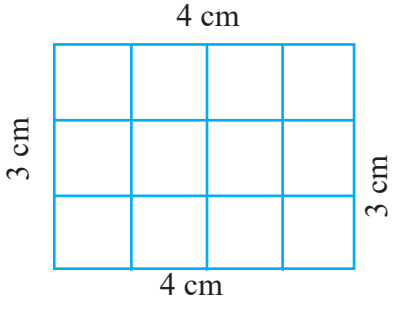


Figure (A)

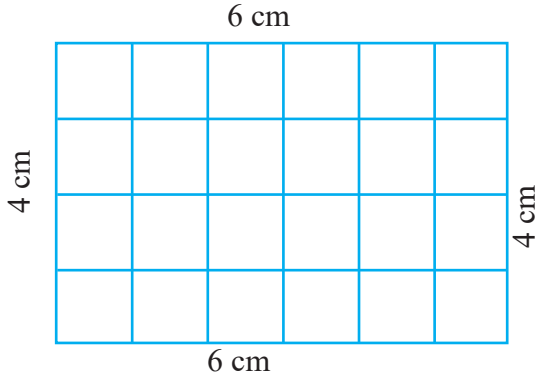


Figure (B)

Now, calculate the area by counting the number of squares with 1 unit sides.

In figure (A),

Number of squares with 1 unit length on the length side = 4

Number of squares with 1 unit length on the breadth side = 3

Area = Total number of squares with 1 unit length.

= 12 sq. centimeter (Since the area of the square having length 1 cm is 1 sq. cm)

In figure (B),

Number of squares with 1 unit length on the length side = 6

Number of squares with 1 unit length on the breadth side = 4

Area = Total number of squares with 1 unit length

= 24 sq. centimeter (Since the area of the square having length 1 cm is 1 sq. cm)

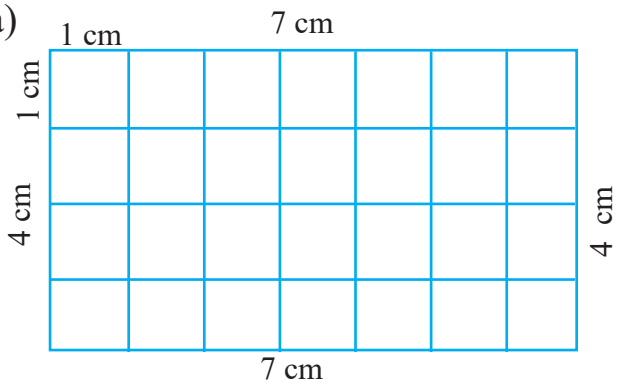
Now, let's see the relation between length, breadth and area from the above discussion.

Figure	Length	Breadth	Area	Relation
(A)	4 cm	3 cm	12 sq. cm	$4 \times 3 = 12$
(B)	6 cm	4 cm	24 sq. cm	$6 \times 4 = 24$
Conclusion: Area of a rectangular surface is the product of its length and breadth. The area of a square surface is the product of length and length.				

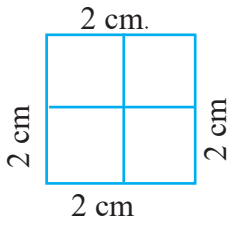
Example 3

Find the perimeter of the given shapes by counting the squares.

(a)



(b)



Solution

(a) Here,

Number of squares with 1 unit length on the length side = 7

Number of squares with 1 unit length on the breadth side = 4

Area = Total number of squares with 1 unit length = 28

= 28 sq. cm (Since the area of the square having length 1 cm is 1 sq. cm)

Alternative method,

Area of rectangle = $7 \times 4 = 28$ sq. cm

(b) Here,

Number of squares with 1 unit length on the length side = 2

Number of squares with 1 unit slength on the breadth side = 2

Area = Total number of squares with 1 unit length = 4

= 4 sq. cm (Since the area of square having length 1 cm is 1 sq. cm)

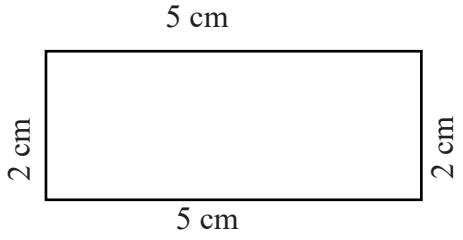
Alternative method,

Area of square = $2 \times 2 = 4$ sq. cm

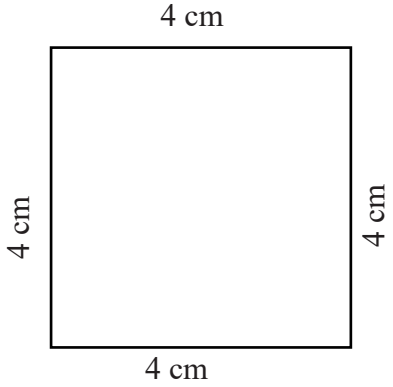
Example 4

Find the area of the given shapes based on length and breadth.

(a)

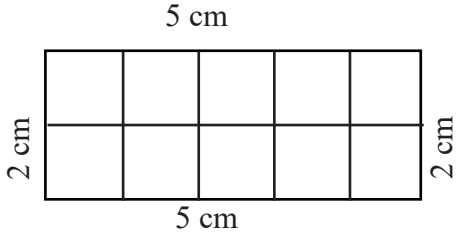


(b)



Solution

(a) Here, drawing the squares having 1 cm length on the given shape



Now, number of squares with 1 unit length on the rectangle's length side = 5

Number of squares with 1 unit length on the rectangle's breadth side = 2

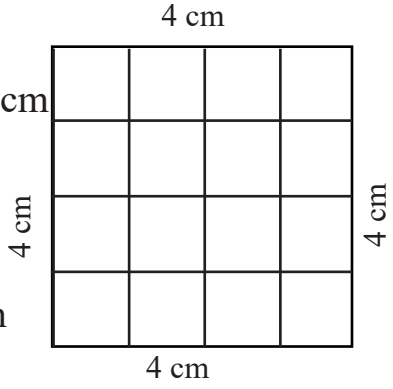
Area of the rectangle = ?

Area of the rectangle = 5 × 2 = 10 sq. cm

(b) Number of squares with 1 unit length on the square's length side = 4

Area of the square = ?

Area of the square = 4 × 4 = 16 sq. cm

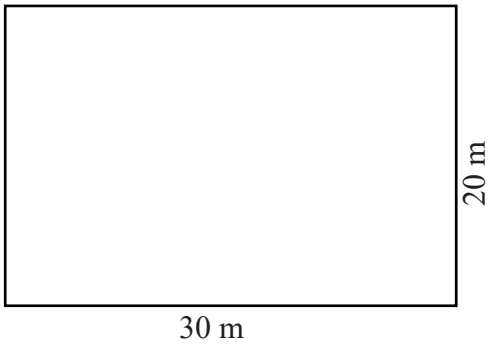


Example 5

Length and breadth of a rectangular field is 30 m and 20 m respectively.

(a) Find the area of the field.

(b) How long barbed wire will be required to fence 3 times around the field?



Solution

Here, length of the field = 30 m

Breadth of the field = 20 m

(a) Area of the rectangle =?

We know that,

Area of a rectangle = 30 × 20 = 600 sq. meter

Hence, the area of the rectangular field is 600 sq. meters.

(b) We get the perimeter of the field while fencing the barbed wire once.

Fencing barbed wire 3 times = 3 × perimeter

We know that,

Perimeter of a rectangular surface = 2 × 30 + 2 × 20 = 60 + 40 = 100 m

Hence, perimeter of the given rectangular field = 100 m

100 m barbed wire is needed to fenceit once.

Fencing in with the barbed wire 3 times = 3 × 100 m = 300 m

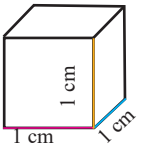
Hence, 300 m barbed wire is required to fence 3 times around the given field.

12.1.3 Volume

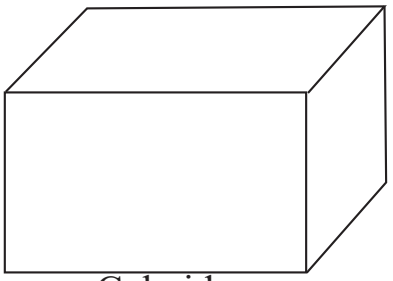
Activity 3

Do the activities to find the volume of a cuboid by studying the given text.

The volume of a cube having 1 unit length is 1 cubic unit. If length is in 1 cm, then volume of the cube is 1 cubic cm.



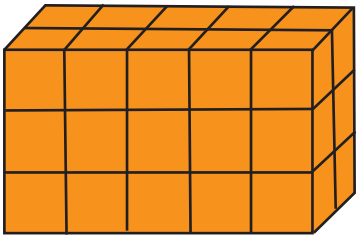
Cube having volume 1 cubic centimeter is used to find the volume of cuboid. The volume of a cuboid is the number of cubes having 1 unit length.



Cuboid

Now, let's construct a cuboid by taking 5 cubes having 1 unit length on length, 2 on breadth and 3 on height.

Here, if we put 5 cubes on length, 2 cubes on breadth and 2 cubes on height, we need 30 cubes having 1 unit length for constructing a cuboid. Therefore, the volume of the cuboid is 30 cubic unit. If length is in 1 cm, then volume of the cuboid is 30 cubic cm.



The volume of a cuboid is the total number of cubes having 1 unit sides that is on the cuboid.

If the length of the cube that is used to construct the above cuboid is 1 cm,

Length of the cuboid = 5 cm

Breadth of the cuboid = 2 cm

Height of the cuboid = 3 cm

Volume of the cuboid = 30 cubic cm

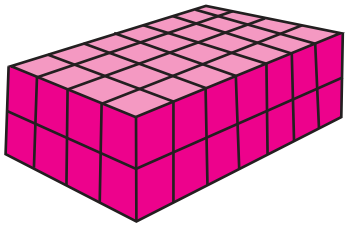
Here, let's see the relation between length, breadth, height and volume,

Length	Breadth	Height	Volume	Relation
5 cm	2 cm	3 cm	30 cubic cm	5 × 2× 3 = 30
Conclusion: The volume of a cuboid is the product of length, breadth and height. If the cuboid is a cube, then length, breadth and height are equal. So, volume of cube is the product of length, length and length.				

Example 6

How many cubes having 1 cubic cm will be there on a cuboid with 7 cm length, 4 cm breadth and 2 cm height ? What is the volume of the cuboid?

Solution



Here, Length = 7 cm

Breadth = 4 cm

Height = 2 cm

Volume of the cuboid = ?

In the figure, there are 7 cubes on lower level of length size and 4 cubes on breadth. So, altogether there are 7 × 4 = 28 cubes having 1 cubic cm. Likewise, there are 2 × 28 = 56 cubes having 1 cubic cm on two levels in total. So, volume of the cuboid is 56 cubic cm.

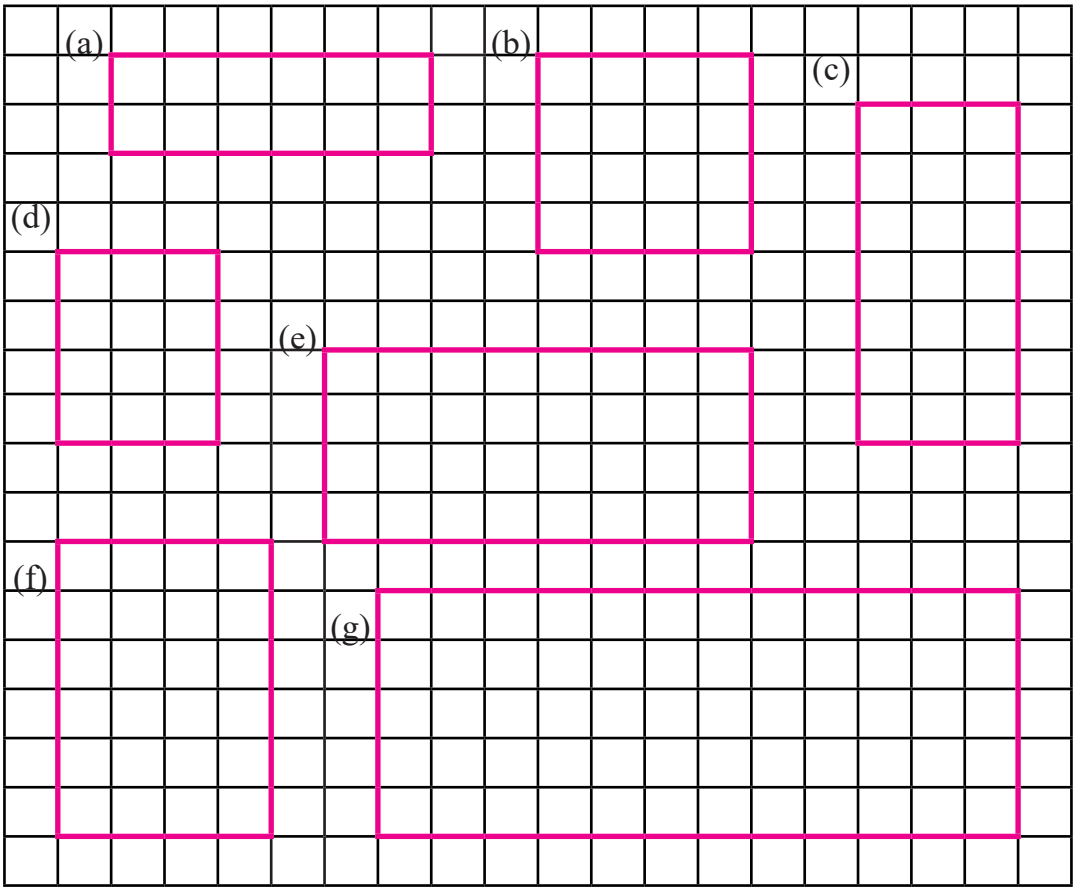
Alternative method,

Volume of the cuboid = 7 × 4 × 2 = 56 cubic cm

Hence, the volume of the cuboid is 56 cubic cm.

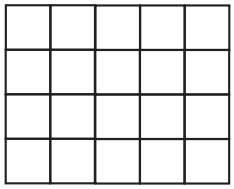
Exercise 12

1. Find the perimeter and area of the given shapes by counting squares.

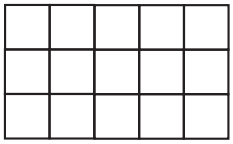


2. Find the perimeter and area of the given shapes based on the length and breadth.

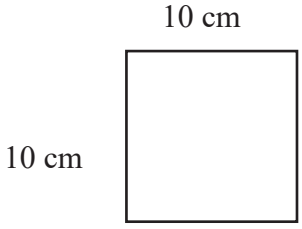
(a)



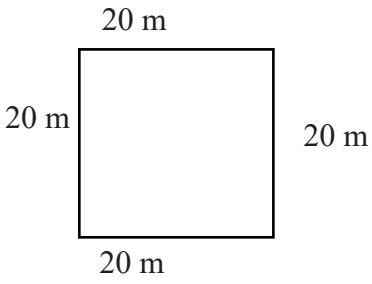
(b)



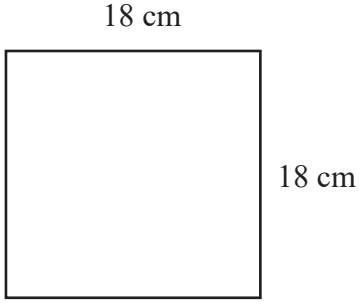
(c)



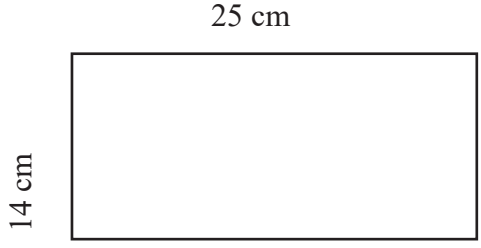
(d)



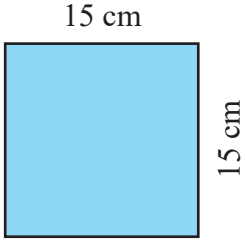
(e)



(f)



(g)



3. Calculate the perimeter and area of the rectangular surfaces having the following length and breadth:

(a) $l = 8$ cm, b = 6 cm

(b) $l = 7$ cm, b = 3 cm

(c) $l = 6$ cm, b = 5 cm

(d) $l = 10$ cm, b = 5 cm

(e) $l = 6.8$ cm, b = 3 cm (f) $l = 5.6$ cm, b = 2 cm

(g) $l = 10.3$ cm, b = 6.5 cm

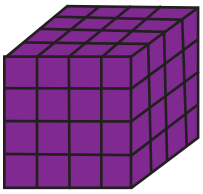
4. Calculate the perimeter and area of the squares having the following length :

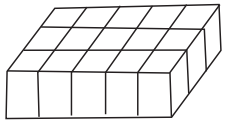
(a) $l = 3$ cm (b) $l = 5$ cm

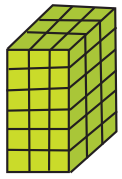
(c) $l = 8$ cm (d) $l = 12$ cm

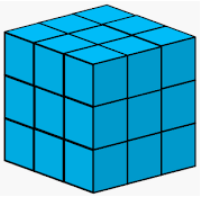
(e) $l = 5\frac{1}{2}$ cm (f) $l = 7.5$ cm

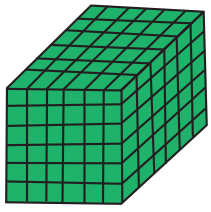
5. Find the volume (Here, one cube = 1 cubic cm)

(a) 

(b) 

(c) 

(d) 

(e) 

6. Calculate the volume of each rectangular objects having the following measures:

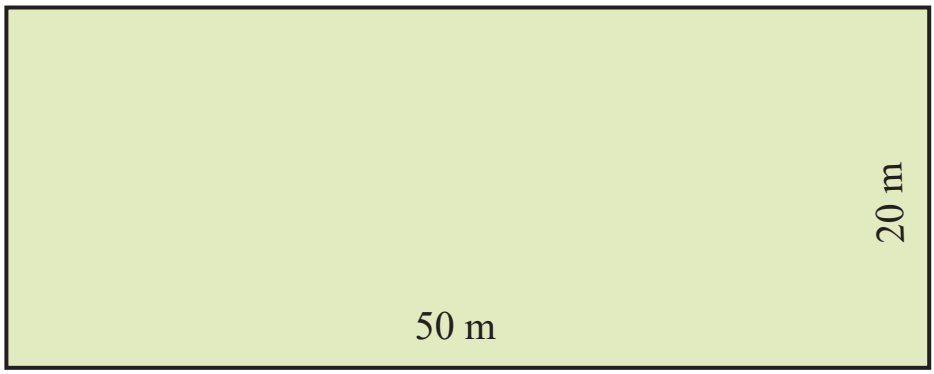
(a) Length = 4 cm, breadth = 3 cm, height = 2 cm

(b) Length = 5 cm, breadth = 2 cm, height = 1 cm

(c) Length = 3.5 cm, breadth = 2.2 cm, height = 4 cm

(d) Length = 4.8 cm, breadth = 3.3 cm, height = 2.5 cm

7. A rectangular field having 50 m length and 20 m breadth is given.



(a) Find the perimeter of the field.

(b) How long barbed wire will be required to fence 5 times around the field?

(c) Find the area of the field.

(d) If we increase the length by 10 m and reduce the breadth by 10 m, what will be the impact on its area, Compare with previous area.

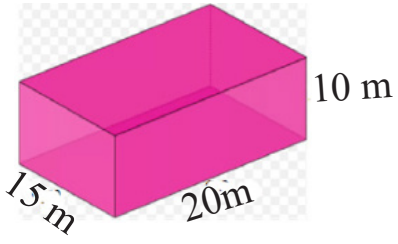
8. A square field has the length 35 m.

(a) Find the perimeter of the field.

(b) How long barbed wire will be required to fence 5 times around the field in order to protect the farming from animals?

(c) Find the area of the field.

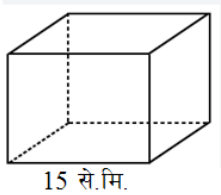
9. How many cubes with 1 cubic unit can be placed in the given box? What is the volume of the box?



10. There is given a cubic box having 15 cm sides.

(a) What is the volume of the box?

(b) How many cubes with 1 cubic unit can fit in the box?



11. If a rectangular field has the length 105 m and breadth 68 m. Then,

(a) Find the perimeter.

(b) Find the area.

12. If a square field has length 15 m. Then, how long barbed wire is needed to fence 4 times around the field?

13. How many cubes with 1 cubic unit fit in the box having length 15 cm, breadth 12 cm and height 3 cm? What is the volume of the box?

14. What is the volume of a cube shape box with 12 cm sides? How many cubes with 1 cubic unit fit in that box?

Project Work

Measure the length, breadth and height of your Nepali textbook with the help of a ruler and write it on your exercise book. Then, find the area, perimeter and volume of the book and solve the problem on cardboard paper and present in your class.

Mixed Exercise

1. Transform 12 hours time to 24 hours time:

   (a) 9:39 AM (b) 3:29 PM (c) 5:15 PM

2. Transform 24 hours time to 12 hours time:

   (a) 15:45 (b) 4:39:40 (c) 16:45:30

3. It takes 3 hours 15 minutes to fill a tank. How much time does it take to fill 5 tanks with the same size and type?

4. Divide:

(a) 15 hours 30 minutes 48 seconds by 4

(b) 20 years 10 months 15 days by 9

(c) 26 liter 760 mililiter by 8

5. Daily schedule of a teacher is given below:

- In the morning 5:00 to 8:45; for meditation and personal works
- From 8:45 to 9:15; time to eat and wear clothes
- From 9:15 to 9:30; time to reach school
- Everyday 5 periods, 50 minutes for each period
- Time to return home from school at 4:00.

(a) How much time does he give for meditation and personal work?

(b) How much time is allocated for having lunch, wearing clothes and going to school altogether?

(c) How much time does he teach in a day? Find in hour and minutes.

(d) How much time does he spend at school out of classroom?

6. Here is given the time table for buses to go to different place from Pokhara. Bus A and B moved from Pokhara to Kathmandu in the morning and they have reached in the following place at the given time;

Pokhara	BusA	Bus B
Khairenitar	6:45 AM	7:00 AM
Damauli	7:50 AM	8:45 AM
Dumre	9:30 AM	10:30 AM
Abukhairani	10:15 AM	12:30 Noon
Muglin	11:00 AM	1:00 PM
Mahadevbesi	11:50 AM	2:30 PM
Naubise	1:00 PM	4:00 PM
Kathmandu	2:00 PM	5:30 PM

Answer the following questions:

(a) What time did bus A reach to Damauli?

(b) How much later did Bus B reach to Damauli than Bus A?

(c) After how much time do the passangers who were riding on Bus A reached to Dumre?

(d) How much time did the bus B take to reach Mahadevbeshi from Dumre?

(e) Where did bus B reach when bus A was at Naubise?

(f) How long after Bus B reached to Kathmandu then Bus A?

7. **At Ramesh's school, Mathematics of grade 5 is taught 6 days a week. Everyday, 40 minutes are allotted for Mathematics. Answer the following questions by looking at the calender of this month.**

   (a) How long is mathematics taught in a week?

   (b) How long has mathematics been taught this month except vacation day and Saturday? Find in hours and minutes.

   (c) If 50 minutes are alloted for mathematics everyday, then how long more would it be taught this month? Find in hours and minutes.

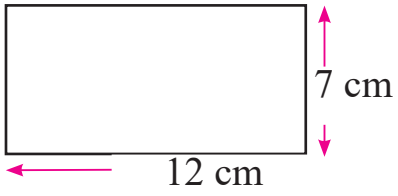
8. 6 players completed a realy race of 7 km 200 m. If all the players completed equal distance of the race,then how long distance did a player run?

9. One textbook has the length 24 cm 8 mm. Find the length of 8 textbooks with the same size.

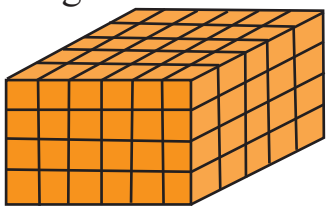
10. Shanta filled 8 cups juice water from a jug with the rate of 350 *ml* each. Still, there was 200 *ml* juice left in the jug. What was the total capacity of the jug?

12. There are 30 packets noodle in a carton box. If the weight of a packet of noodle is 70 gm and noodle box is 170 gm, then what is the weight of the entire box with the noodle?

13. Calculate the perimeter and area of the given rectangular surface:



14. Find the volume of the given cuboid:



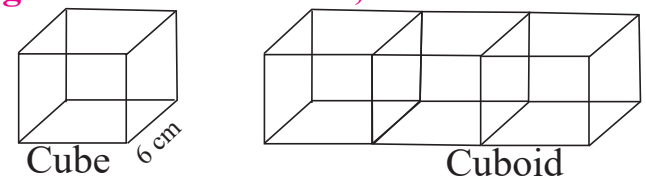
15. How many cubes having 1 unit sides can fit in a box with length 12 cm, breadth 8 cm and height 5 cm. What is the volume of the box?

15. If the length and breadth of a volleyball field is 120 m and 85 m then;

(a) Find the perimeter of the field.

(b) Find the area of the field.

16. The length of the given cube is 6 cm. Cuboid is made by joining such 3 cubes. Then,



(a) What is the length, breadth and height of the cuboid?

(b) Find the volume of the cube.

(c) Find the volume of the cuboid.

17. It takes 40 minutes on foot for Dichen Lapcha to go to school located at 2 km 300 meters. Then,

(a) What is the total time spent to go and come from school in a day?

(b) How much distance does he should walk in a day?

(c) If school opens 6 days a week, then how long distance does he should walk in a week?

(d) The school opens 6 days a week. based on this, how much time does he spend going to and coming from school in a week?

18. Sabita studies in class 7. She studies 7 subjects every day. Time alloted for each subject is 45 minutes. Every day there is 15 minutes assembly in the morning and 30 minutes break. Then,

(a) Find the study time for 7 subjects in minutes.

(b) Find the study time for 7 subjects in hours and minutes.

(c) How long time does Sabina stay on school?

(d) If the school starts from 10:00 am, then find what time the school close?

19. If pants for 7 teachers of a basic school have to be sewn at the rate of 1 m 10 cm each, then:

(a) How much cm of cloth is necessary for each person?

(b) How much cloth is necessary for 7 teachers?

(c) If 3 new teachers are added, then how much more cloth is necessary?

(d) If the cost for 1m cloth is Rs. 700, then how much money is necessary to buy the cloth for 9 persons?

20. If we divided 78 cm 8 mm long sugarcane to 7 persons equally, then:

(a) Change the total length of the sugercane into milimeter.

(b) How long sugercane piece will each person get? Find.

(c) If the sugercane should be divided to 8 persons, then how long sugercane piece will each person get?

(d) If the sugarcane to be distributed to 7 persons has to be distributed to 8 persons, how less sugarcane will each person get? Find.

21. The length of a sugarcane is 2 meter 40 centimeters, Then:

(a) What is the lenght of 10 sugarcane with the same size? Find in meter and centimeter.

(b) If the sugarcane is divided into 5 equal parts, then what is the length of each part? Find in centimeter.

(c) If the sugarcane is cut in such a way that each piece is 30 cm long, then how many people can get the sugarcane pieces equally? Find.

22. A house ower though to distribute 2.25 litres of juice for the construction workers.

(a) How many *ml* is in 2.25 *l*?

(b) If the juice is divided for 9 workers equally, then how much millilitres will each person get?

(c) As stated above, there is 2.25 litre juice in 1 juice bottle, then how many litres of juice will be in 4 such bottles?

(d) If 2 bottles of juice is divided for 5 persons equllay, then how much ml will each person get?

23. A bucket with 5*l* capacity and an empty tank with 500l capacity are shown in the given figure:

(a) How many times should we poure from the bucket with 5*l* capacity to fill the empty tank?

(b) Nawaraj poured water four times from a bottle of 1 litre 200 *ml* capacity to fill a 5 litre bucket Is the bucket full or is there still some space water, calculate.

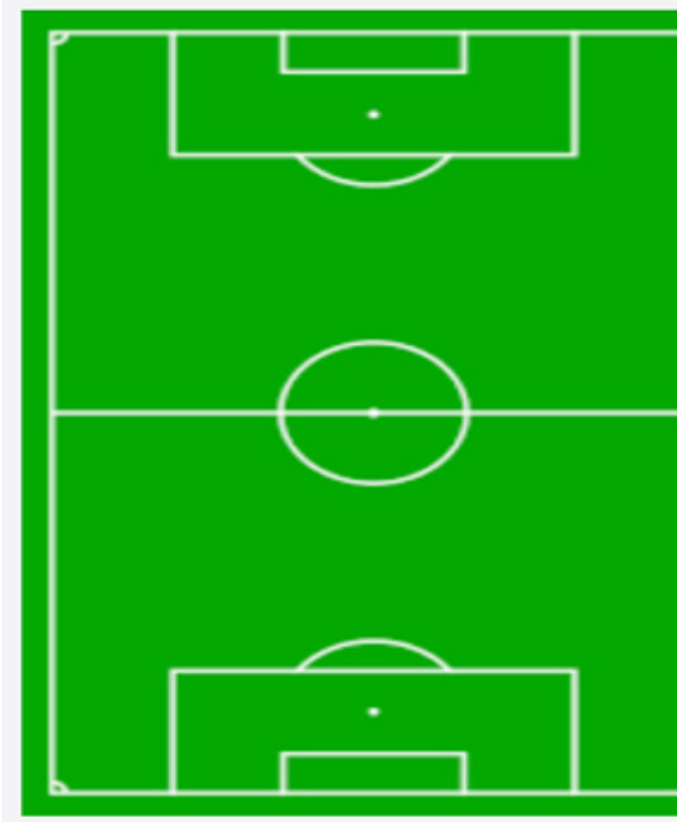
24. There are 30 soaps of 200 g in a soap box,

(a) What is the total weight of all the soaps in that box?

(b) If a soap had 300g weight, then what would be the total weight of all the soaps?

(c) The soaps of the equal weight (from question b above) have to divided to 8 persons equally. How many soaps will each person get?

25. The length and breadth of the given footbal field is 50m and 30m.



(a) How many meters of barbed wire are needed to fence around the field once? Find.

(b) How many meters of barbed wire are needed to fence around the field 5 fimes? Find.

(c) How many square meters of football grass pieces are needed to cover the field? Find.

26. Sarita has planted patato in a farm. To protect the field from wild animals, she has made a plan to fence the field around five times.

(a) How much wire is required to fence the field once?

(b) How much wire is required to fence it 5 times?

(c) How much area of the farm is potato planted?

(d) The price of one meter wire is Rs. 30. How much money does Sarita need to fence her field it 5 times? Calculate.

Lesson 13

Bill and Budget

13.0 Review

Observe the bill given below and discuss the given questions:

Bill no. 00012 **Harit Krishi Farm, Parsa**

PAN no. 105998932 Date: 2079/06/01

Buyer : Shuvechchha Adhikari

S.N.	Name of Goods	Quantity	Rate	Total amount (Rs.)
1.	Couliflower	5 kg	Rs. 50	250
2.	Tomato	2 kg	Rs. 25	50
3.	Cucumber	6 kg	Rs. 35	210
4.	Pumkin	3 kg	Rs. 40	120
5.	Sponge gourd	4 kg	Rs. 15	60
			Total	690

In figure six hundred ninty rupees only

Sushan
.....
Seller

Find the answers to the questions given based on the above bill:

(a) What is name of seller and buyer?

(b) From which shop are the goods bought?

(c) In which date are the goods bought?

(d) How much money did Shuvechchha spend to by cucumber?

(e) How much tomato did Shuvechchha buy?

(f) What is the price of a kilogram of sponge gourd?

(g) How much money did Shuvechchha spend in total?

13.1 Bill

Activity 1

Nirmala brought the following goods for her birthday. The pricelist of the shop is also given. Based on the list, complete the given bill:

Goods to buy

Cauliflower: 6 kg, Potato: 5 kg

Tomato: 2 kg, Sugar: 2 kg

Flour: 3 kg, Chickpeas: 2 kg

Chocolate: 3 packets, Oil: 3 liter

Karuna Grocery Store, Baitadi
Pricelist

Cauliflower: Rs. 50 per kg, Potato: Rs. 43 per kg
Rice: Rs. 80 per kg, Sugar: Rs. 80 per kg
Tomato: Rs. 30 per kg, Flour: Rs. 50 per kg
Chickpeas: Rs. 110 per kg, Oil: Rs. 155 per liter
Salt: Rs. 22 per kg

Karuna Grocery Shop, Baitadi

Bill no. 012 Pan no. 105998933

Buyer : Anupa Sayami Date: 2079/01/03

S.N.	Name of the Goods	Quantity	Rate (Rs.)	Total amount (Rs.)
1.	Couliflower	6 kg	500	300
2.	Potato	5 kg	43	215
3.	Tomato	2 kg	30	60
4.	chickpeas	2 kg	110	220
5.	Sugar	2 kg	80	160
6.	Flour	3 kg	50	150
7.	Chocolate	3 packets	150	450
8.	Oil	3l	155	465
Total				2,020

In figure two thousand twenty rupees only

Karuna

Seller

In the above table, total price and the amount of all the goods are calculated based on the quantity and price for each item.

Karuna Grocery Store has issued the above bill to Anupa after she bought the goods. The goods are bought on 2079/01/03. Anupa has paid Rs. 2020 to the shopkeeper.

In the above bill, the unit price of the goods are written as rate. Likewise, the total price of a goods is calcualted by multyplying the quantity of each item and rate. For example:

The price of 1 kilogram chickpeas is Rs. 110. So, the price for 2 kilogram chickpeas is Rs. 110 × 2 = Rs. 220. Likwise, the price of 3 liter oil is Rs. 155 × 3 = Rs. 465.

(a) How is the above bill?

(b) What are the informations necessary to prepare the bill? Discuss.

A bill includes bill number, name and place of the shop from which goods bought, seller/buyer's name, date when goods purchased, name of the goods that are bought, quantity, rate and total price of the goods, etc. To calculate the total price of the goods we need to multiply the quantity of the goods and rate.

Word that used in bill

Common Terms Used in Bills

- Buyer - Constumer or person who buys the goods
- Seller - Shopkeeper or person who sell goods
- Quantity - Total amount of goods
- Rate - Unit price of goods
- In figure - Total price written in figures words.

Example 1

Tulasi bought medicine from Armala Medical. She bought 4 strips of cetamol for Rs. 15 per strip and 2 strips of amoxicillin for Rs. 120 per strip. Similarly, she bought 12 packets of Jibanjal for Rs. 15 per packet and 5 strips of amlode for Rs. 180 per strip. Based on this, prepare the bill for the items Tulashi bought.

Solution

We can prepare the bill from given information as:

Armala Medical, Pokhara

Bill no. 018
Pan no. 105998934
Buyer : Tulasi Sapkota

Date: 2079/06/05

S.N.	Name of Goods	Quantity	Rate (Rs.)	Total amount (Rs.)
1.	Citamole	4 strips	15	60
2.	Amoxicillin	2 strips	120	240
3.	Jibanjal	12 packet	15	180
4.	Amlod	5 strips	180	900
			Total	1,380

In figure: one thousand three hundred eighty rupees only.

Samir
Seller

Example 2

The price list of a fruits shop is given in the table below. Prepare the bill of fruits of the given quantity based on given list.

Goods to buy
Apple: 6 kg, Orange: 5 kg
Papaya: 2 kg, Grapes: 2 kg
Junar: 3 kg, Banana: 3 dozen

Bhandari Fruit Shop

Pricelist

Apple: Rs. 230 per kg,	Pomegranate: Rs. 290 per kg
Orange: Rs. 80 per kg,	Grapes: Rs. 200 per kg
Papaya: Rs. 90 per kg,	Mango: Rs. 130 per kg
Banana: Rs. 80 per dozen,	Junar: Rs. 110 per kg

Solution

We can prepare the bill from given information as:

Bhandari Fruits Shop, Dhampus, Kaski

Bill no. 013

Pan no. 105998935

Buyer : *Bikas Lama* Date: 2079/06/05

S.N.	Name of Goods	Quantity	Rate	Total amount (Rs.)
1.	Apple	6 kg	Rs. 230	1,380
2.	Papaya	2 kg	Rs. 90	180
3.	Orange	5 kg	Rs. 80	400
4.	Grapes	2 kg	Rs. 200	400
5.	Junar	3 kg	Rs. 110	330
6.	Banana	3 dozen	Rs. 80	240
			Total	2,930

In figure two thousand nine hundred and thirty rupees only

Nabina

Seller

Exercise 13.1

1. A bill is given below. Some information is already given. Fill all other information.

Sagar Shop, Baglung

Bill no. 0224
Pan no. 105998935
Buyer : *Suntali* Date: 2079/07/15

S.N.	Name of Goods	Quantity	Rate		Total amount (Rs.)	
			Rs.	Paisa	Rs.	Paisa
1.	Couliflower	3 kg	55	50	..	
2.	Tomato	5 kg	80	25		
3.	Checken	6 kg			2160	00
		Discount			56	
		Total				

In figure.....

.....
Signature

2. A model of a bill is given below. Fill in the blanks and answer the questions given.

Chetana Fency Store, Parbat

Bill no. 012
Pan no. 105998935
Buyer : Dal Bahadur Rana Date: 2079/07/15

S.N.	Name of Goods	Quantity	Rate		Total amount (Rs.)	
			Rs.	Paisa	Rs.	Paisa
1.	T-shirt					
2.	Belt					
3.	Woolen shock					
4.	Sandu					
5.	Bag					
		Total				

In figure.....

.....
Signatur

(a) How much money did Dal Bahadur spend to buy the belt?

(b) How much money did he spend to buy the bag?

(c) Among the belt and T-shirt, which is costlier and by what percentage?

(d) Which is the most expensive item ?

(e) In which month and day was the bill issued?

(f) What is the total cost ? Write in numeral and in figure.

3. Study the table below and answer the given questions:

Bhakunde Grocery Store, Sikles

Bill No. 02313 PAN no.: 105998936

Buyer: **Fulmaya Tamang** Date : 2079/05/01

SN	Name of Goods	Quantity	Amount	Total Price (Rs)
1.	Couliflower	6 kg	Rs. 50	300
2.	Potato	5 kg	Rs. 43	215
3.	Tomato	3 kg	Rs. 30	90
4.	Chickpeas	2 kg	Rs. 110	220
5.	Sugar	2 kg	Rs. 80	160
6.	Flour	2 kg	Rs. 50	100
7.	Chocolate	3 Packets	Rs. 150	450
8.	Oil	$\frac{1}{2}$ *l*	Rs. 150	75
			Total	1610

In figure: One thousand six hundred ten only.

Angkaji Sherpa
Seller

(a) What are the name of buyer and seller?

(b) How much money did Fulmaya spend to buy couliflower?

(c) Which cost more, couliflower or chocolate and by how much?

(d) Which good cost the highest?

(e) What is the total cost?

4. Make bills for each situation below:

(a) The detail of goods bought by Rabina

Apple 1.5 kg (Rs. 150 per kg)
Orange 2 kg (Rs. 120 per kg)
Banana 1 dozen (Rs. 100 per dozen)
Grapes 2 kg (Rs. 180 per kg)
Pomegranate 2 kg (Rs. 250 per kg)

(b) The detail of goods bought by Dhaniya

Potato 3 kg (Rs. 60 per kg)
Suji 3 kg (Rs. 50 per kg)
Rice 10 kg (Rs. 80 per kg)
Red gram 2 kg (Rs. 130 per kg)
Rajma 2 kg (Rs. 130 per kg)

(c) The detail of goods bought by Niruta

Potato 5 kg (Rs. 60 per kg)
Suji 3 kg (Rs. 50 per kg)
Rice 10 kg (Rs. 80 per kg)
Red gram 3 kg (Rs. 130 per kg)
Turmeric 0.5 kg (Rs. 130 per kg)
Halwa 1.5 kg (Rs. 60 per kg)

(d) The detail of goods bought by Thir Bahadur

Potato 5 kg (Rs. 60 per kg)
Rajma 3 kg (Rs. 130 per kg)
Red gram 3 kg (Rs. 130 per kg)
Rice 25 kg (Rs. 120 per kg)
Chickpeas gram 3 kg (Rs. 125 per kg)

5. Sushma bought 12 copies for Rs. 35 per piece, 3 bullet pen for Rs. 86 per piece, 10 pencils for Rs.15 per piece, 2 balls for Rs. 250 per piece and a bottle of ink for Rs. 35 per bottle. Now, prepare the bill for the goods that Sushma bought.

Project Work

Note down the price of some goods from a nearby shop. List out the goods that are bought in one month for your home and prepare a model bill based on the price. Then, present it in your classroom.

13.2 Budget

Activity 1

Min Bahadur's famil's monthly budget is given on the table below. Based on this table, discuss on following questions:

Min Bahadur's Family's Monthly Budget

Income		Expenses	
Source (Title)	**Amount (Rs.)**	**Title**	**Amount (Rs.)**
From job	Rs. 15,000	Food items	Rs. 8,000
By selling vegetable	Rs. 5,000	Clothes	Rs. 6,000
By selling hen	Rs. 2,000	Education	Rs. 8,000
By selling milk	Rs. 6,000	Farm tools	Rs. 6,000
By selling goats	Rs. 9,000	Others	Rs. 5,000
Total	Rs. 37,000		Rs. 33,000

(a) What are the sources of Min Bahadur's income?

(b) What are the titles in which Min Bahadur has the expenses?

(c) What is the relation between income and expenses?

(d) How much is the monthly saving?

The money we spend on buying goods in our daily life is received from different sources. These soruces are the sorces of income. For example: job, occupation, bussiness, wages, etc. Likewise, food item, cloth, education, agricultural item, etc. are the titles of expenses. The details of income and expense is called budget.

After studying Min Bahadur's family's budget we can say that total income is Rs. 37,000 and total expense is Rs. 33,000. Therefore, after all the expenses from his income, he has some amount remaining, which is called saving.

Saving = Income - Expense

Here, sMin Bahadur's saving amount = 37,000 - 33,000 = Rs. 4,000

What happens if expense is more than income? Discuss in groups and wirte .

Estimated detail of income and expense is budget.

Example 3

The following is the expense detail of a farmer's family with the income of Rs. 15,000 from vegetable and Rs. 20,000 from lives stock respectively:

Monthely Estimated Expense		
Food: Rs. 7,000	Education: Rs. 4,500	Cloth: Rs. 4,500,
Communication: Rs. 1,500	Others: Rs. 2,000	

Prepare a budget for 6 months of the family and answer the questions based on the budget:

(a) What is total income?

(b) What is total expense?

(c) What is his saving or loan within 6 months?

Solution

Here, we can make the budget of 6 months of the farmer's family:

6 month's income of farmer's family		Estimated expense		
Source	Amount (Rs.)	Title	Expense (Rs.) per month	Total expense of 6 months
From vegetable	Rs. 15,000 × 6 = Rs. 90,000	Food	Rs. 7,000	Rs. 7,000 ×6 = Rs. 42,000
		Education	Rs. 4,500	Rs. 4,500 × 6 = Rs. 27,000
		Cloth	Rs. 4,500	Rs. 4,500 × 6 = Rs. 27,000
Form livestock	Rs. 20,000 × 6 = Rs. 1,20,000	Communication	Rs. 1,500	Rs. 1,500 × 6 = Rs. 9,000
		Others	Rs. 2,000	Rs. 2,000 × 6 = Rs. 12,000
Total	Rs. 2,10,000			Rs. 1,17,000
Saving = Total income - total expense = Rs. 2,10,000 - Rs. 1, 17,000 = Rs. 93,000				

Based on above budget table,

(a) Total income of 6 months = Rs. 2,10,000

(b) Total estimated espense of 6 months = Rs. 1, 17, 000

(c) Total saving of 6 months = Rs. 93,000

Example 4

The following is the estimated expense for 2 days' educational tour of 25 persons among class five students and teachers form Harisiddhi Basic School:

Transportation Rs. 12,500, Food Rs. 25,000, Lodging Rs. 15,000, Entertainment Rs. 5,000 and others Rs. 5,000.

How much should be collected from each individual? Prepare the budget of the educational tour.

Solution

Based on the above details of expense total expense for educational tour is Rs. 62,500. We man present it in the table as:

Budget of an educational tour

Income		Estimated expense	
Title	Amount (Rs.)	Title	Total expense for 25 persons
Collected amount from 25 participants	Rs. 2,500 × 25 = Rs. 62,500	on food Transportation Lodging Entertainment Others	Rs. 25,000 Rs. 12,500 Rs. 15,000 Rs. 5,000 Rs. 5,000
Total	Rs. 62,500		Rs. 62,500

Now, we need to collect money from 25 persons because 25 persons are going on the educational tour. Therefore, 62500 ÷ 25 = 2500

Exercise 13.2

1. Community saving institute conducted a picnic for 40 persons. The following is the budget for that. Look at the budget and answer the questions given.

Budget of a picnic program of community saving institute

Income		Expenses	
Sources or Titles	**Amount (Rs.)**	**Title**	**Amount (Rs.)**
Collected amount from participants Grant form institute	Rs. 40,000 Rs. 25,000	On food Transportation Music system Cold drinks Prize Others	Rs. 41,000 Rs. 8,000 Rs. 2,500 Rs. 5,000 Rs. 3,000 Rs. 2,900
Total	Rs. 65,000		Rs. 62,400

(a) What is the total income?

(b) What are the titles of income for the picnic program?

(c) What is the total expense of the picnic program?

(d) In which title did they spend the most?

(e) What is situation of income and expense of the picnic program?

(f) Only Rs. 62,400 is spent from Rs. 65,000. If we divide remaining money among all participants eqully, how much money each participant will receive?

2. The following is the detail of income and expense of Ramu's family. Prepare Ramu's family's monthly budget and answer the given questions.

Income	Expense
Selling vegetable : Rs. 10,000	Food : Rs. 8,000
Selling food Item : Rs. 12,000	Education: Rs. 6,000
Wages : Rs. 10,000	Interest of bank : Rs. 3,000
	Communication: Rs. 2,000
	Others: Rs. 4,000

(a) Which is greater among income and expenses on Ramu's family?

(b) What is the source of the highest income?

(c) Which is the least imcome source?

(d) In which title does he have to spend the most?

(e) In which title does he have to spend the least?

3. Your school has decided to go to Lumbini for an educational tour. Only 35 students are participating in the tour. Now, prepare a budget for the tour.

Project Work

Prepare the budget for one month based on your family's income and expense and present it to the class.

Lesson 14

Presentation of Data

14.0 Review

The number of people having different occupations in a village is given below. Based on the table, discuss the given questions and present your conclusion:

Occupations	Teacher	Doctor	Farmer	Bussiness man	Student
Number	25	20	40	35	30

(a) How many farmers are there?

(b) Which occupations has the least number and how much?

(c) What is the difference between the number of farmers and doctor?

(d) What is the total number of people having different occupation on that village?

14.1 Tabulation of Data

Activity 1

The students with the following castes are found while observing the roll numbers in the attendane register of Grade 5. Make a table based on the information.

Acharya, Gurung, Pariyar, Yadav, Shrestha, Acharya, Gurung, Pariyar, Yadav, Shrestha, Acharya, Acharya, Bhandary, Gurung, Yadav, Acharya, Bhandari, Yadav, Shrestha, Acharya, Shrestha, Gurung, Bhandari, Shrestha, Gurung

Now, putting the data on the table,

We can show the above data on a table as:

Caste	Acharya	Gurung	Pariyar	Yadav	Bhandari	Shrestha
Number of Students	6	5	2	4	3	5

Activity 2

Ask the question among the place given "which place do you like the most?" to all your friends. Then fill the information that you got in the table and discuss with your friends.

Details of favorite places of class 5 students:

Favorite place	Illam	Janakpur	Kathmandu	Pokhara	Lumbini	Surkhet	Dhanga-dhi
Number of student							

Example 1

Grade 5 students were asked "which color do you like the most?" Their answer is given below. Make a table using the information.

red, blue, red, green, blue, red, blue, green, white, white, purple, yellow, orange, red, blue, red, green, blue, red, blue, green, white, white, purple, yellow, orange, red, green, blue, red, blue, green, white, white, purple, yellow, green, white, red

Solution

We can show the above data in a table as:

Color	Red	Blue	White	Yellow	Purple	Orange	Green
Number of Students	9	8	7	3	3	2	7

Example 2

The marks scored by the students of grade 5 in a unit test of English subject with 20 full marks is given below. Make a table from the data.

12, 11, 13, 9, 10, 14, 12, 13, 11,12, 11, 12, 13, 14, 15, 13, 14, 12, 12, 12,12,13,11,12,12,11,10, 10, 12, 14, 15, 9, 13, 11, 12, 11

Solution

We can show the above data in a table as:

Score	9	10	11	12	13	14	15
Number of Students	2	3	6	12	6	4	2

Exercise 14.1

1. 'What is your occupations?' this question was asked to 26 members of Sirjana Tole. Their answer is given below:

Occupation of people who lives on Sirjana toll
doctor, lawyer, teacher, employee, farmer, farmer, nurse, farmer, emplyee, farmer, doctor, lawyer, nurse, teacher, farmer, teacher, farmer, doctor, farmer, farmer, teacher, employee

(a) Make a table based on the given information.
(b) What is the difference between the numbers of farmer and number of doctors?
(c) In which occupation do most people involve?
(d) What is the difference between the ocupation done by the highest number of people and the one done by the least number of people?

2. The description of the animals grazing in a field is given below. Answer the following questions based on the information:

Description of animals grazing in a field
cow, goat, buffalo, ox, cow, goat, sheep, buffalo, cow, goat, buffalo, horse, cow, goat, buffalo, cow, goat, sheep, ox, goat, goat, sheep, buffalo, horse, sheep, cow, buffalo, ox, sheep, sheep, goat, sheep, buffalo, cow, ox, horse, sheep, goat

(a) Make a table based on the given information.

(b) By using the table, find which animal is the highest in number? What is their number?

(c) What is the total number of the cow and oxen?

(d) Write the names of the animals in ascending order based on their number.

3. The details of the score achieved by the students of grade 5 in an IQ test with 18 full marks is given below:

12, 11, 13, 10, 14, 13, 11,12, 11, 12, 13, 14, 15, 14, 12, 18, 12, 17, 13, 16, 12, 15, 11, 9, 16, 13, 14, 15, 18

(a) Convert the data into a table.

(b) How many students achieved the highest score?

(c) What is the number of students who achive the least score?

Project work

Ask the name of favourite fruits of your classmates. Make a table from your friend's responses and present it in the class.

14.2 Bar Diagram

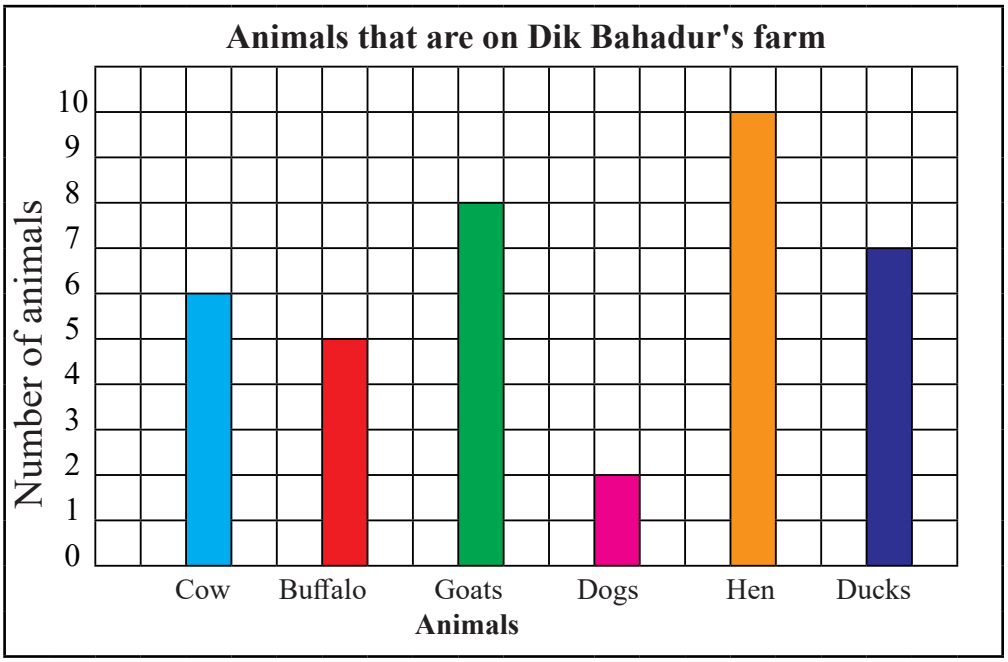
Activity 1

Dik Bahadur is a farmer. He has a agriculure farm, where he has kept the following animals.

Description of animals that are on Dik Bahadur's farm

Cow	Buffalo	Goat	Dog	Hen	Duck
6	5	8	2	10	7

We can show the above table from bar graph as:



(a) What is the above bar graph about?

(b) What is the number of cow?

(c) Which animal is the highest number?

The objects having the same charateristics can be presented in a figure by using bar on square grid paper in order to understand and compare easily. Such afigure is called bar diagram.

We can construct it by putting the names of objects horizontally and the number of objects in vertically. For example: in the above figure, the names of animals are kept on the horizontal axis and number of animals on the vertical axis.

Points to consider while making a bar diagram:

- We should put the names of objects on the horizontal line of a bar diagram.
- We should put the number of objects on the vertical line.
- The distance between two bars should be equal.
- The breadth of the bars should be equal.

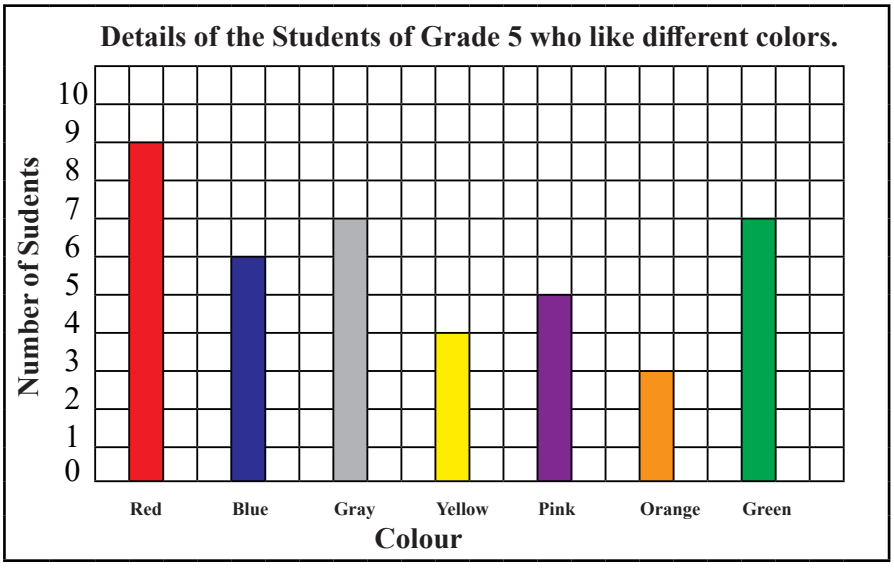
Example 1

The table which is prepared based on the answer of the question "Which colour do you like most?" asked to the students of grade 5 is given below. Prepare a bar diagram based on the table.

Colour	Red	Blue	Brown	Yellow	Purple	Orange	Green
Number of students	9	6	7	4	5	3	7

Solutions

Here, While filling the above table on square grid,



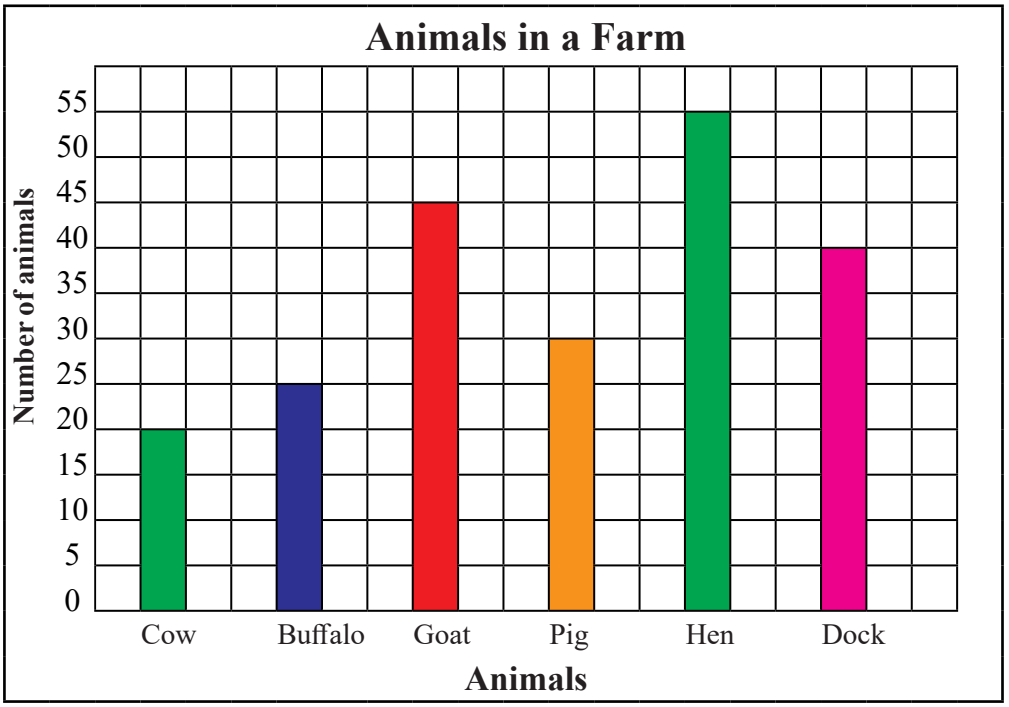
Example 2

The number of animals up to 2079/06/13 is an agriculture farm run by Jaimini Municipality is given in the table below. Prepare a bar diagram based on the table.

Name of animals	Cow	Buffalo	Goat	Pig	Hen	Duck
Number of animals	20	25	45	30	55	40

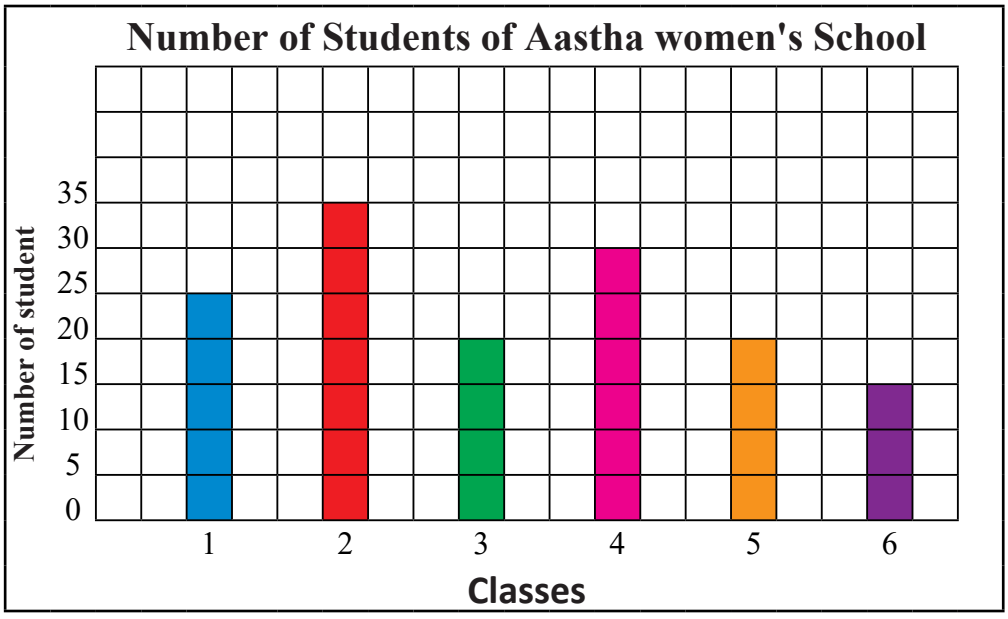
Solution

Here, while filling the above table in a square grid,



Exercise 14.2

1. Observe and study the givne bar diagram and answer the questions given.



(a) Which class has the highest students? How many are there?

(b) Which class has the least number of students?

(c) Which two class have equal number of students? What's their number?

(d) How many more students are there in grade 2 than in 5?

(e) What information is given in the bar diagram?

2. The description of the favourite fruits of the students grades 1 to 3 from Panchakanya Basic School in given below. Show the information in a bar diagram.

Fruits	Mango	Apple	Orange	Banana	Grapes	Pomegranate
Number	10	9	11	9	12	6

3. Kopila has donated the following textbooks for a school library. Present this description in a bar diagram.

Subjects	Mathematics	English	Nepali	Social Studies	General Knowledge
Number	20	25	30	15	10

4. The responses of the question, 'which colour do you like most?' Asked to the students of a school is shown in the table below. Show it on a bar diagram.

Colour	Red	Green	Blue	Yellow	White
Number	25	35	20	15	10

5. The data collected by traffic police about the types of vehicles that move in Tansen Bazar from 6-9 in the morning is given below. Make a bar diagram based on the data.

Name of vehicles	Public Buses	School Buses	Private cars	Government vehicles	Taxis
Numbers	10	7	3	10	25

6. The number of students of a school present in a week is given in the table below. Make a bar diagram based on the table.

Day	Sun	Mon	Tue	Wed	Thu	Fri
Number of students	25	20	22	18	21	23

Project work

Ask how many students are there in each class from 1 to 5 in your school. Make a table and bar diagram on square grid based on the collected information. Then, paste your work on the wall of your classroom.

Mixed Exercise

1. Answer the following questions:

(a) Bikash has sold the following items from his farm in a month:

12 kg cucumber with the rate of Rs. 50 per kg

16 kg bottle gourd with the rate of Rs. 25 per kg

20 kg pumkin with the rate of Rs. 20

15 kg tomato with the rate of Rs. 60

2 kg chilli with the rate of Rs. 120

5 hens with the rate of Rs. 100 per hen

A goat for Rs. 12,000

Prepare a bill based on the given informations

(b) Bikash has bought the following items in a month.

A sack of rice with the rate of Rs. 2,000 per sack, 5l oil with the rate of Rs. 220 per liter, 5 kg sugar with the rate of Rs. 80 per kg, cloth with total amount Rs. 5,000, 12 kg dana with the rate of Rs. 50 per kg.

Prepare a bill of the above items.

(c) Prepare bikash's one month budge based on the above bills on (a) and (b). Answer the following questions based on the budget.

(i) What was Bikash's total income in one month?

(ii) What was Bikash's total expense in one month?

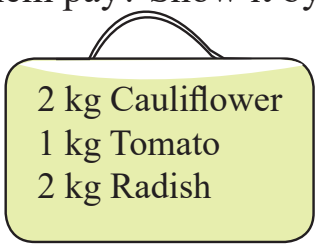
(iii) Did he save some money or was he in loan after a month?

2. The price list of a day at Kalimati wholesale Market is given below:

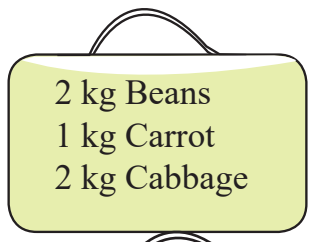
Price list	
Description	Price per kg
Cauliflower	Rs. 70
Cabbage	Rs. 35
Tomato	Rs. 40
Beans	Rs. 60
Green peas	Rs. 65
Chilly	Rs. 80
Bitter gourd	Rs. 90
Carrot	Rs. 55
Raddish	Rs. 50

(a) Four persons bought the vegetables according to the list given in (i), (ii), (iii) and (iv) respectively. How much price did each of them pay? Show it by making bills:

(i)

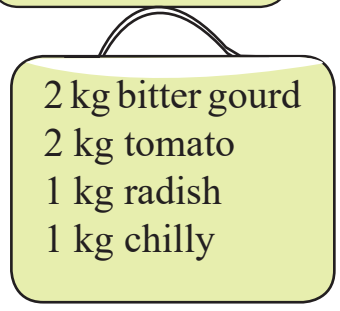


(ii)



(iii)

(iv)



(b) Which of above four bills has the highest expenditure?

3. The following is a month budget of Ram Sewak Tharu's family. Answer the following questions by looking at the budget:

Income		**Expense**	
Source	Amount (Rs.)	Title	Amount (Rs.)
Vegetable	7,000	Food Item	8,000
Hen	10,000	Cloth	3,000
Milk	8,000	Education	12,000
Goats	9,000	Others	3,000
Total	**34,000**		**26,000**

(a) Which is greater in Ram Sewak's family; income or e xpenses?

(b) How much money does the family save in a month?

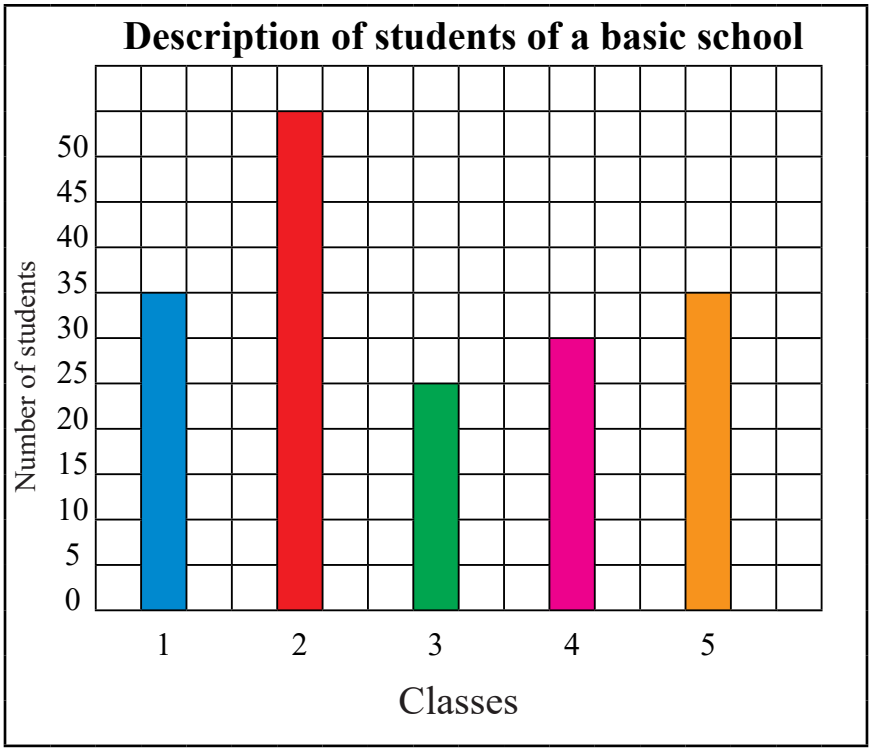
(c) What is the most and least source of their income?

(d) In which titles do they spend money the most and the least?

(e) If the family saves equal amount every month, how much will they save in a year?

(f) If his family spent 2 times more money on cloth in Bhadra and Asoj than in other months, then what would be the relation between income and expense in those months?

4. Observe the bar diagram and present the students detail in a table:



5. The types of vehicles and their number passing from Sahid Gate during 6 am to 7 am on Saturday is given in the table below. Study the table an answer these questions:

Types of vehicles	Number of vehicles
Bus	12
Mini-Bus	16
Private car	20
Tempo	10
Taxi	22

(a) Make a bar diagram based on the given data.

(b) Which vehicle is used most?

(c) Which vehicle is used least?

(d) If one third of the buses went out of Kathmandu valley, then how many buses went out of Kathmandu?

6. 50 students of a Basic School are asked: Which is your favourite fruit? The aswers they gave is given in the table below.

Orange	Banana	Grapes	Orange	Banana	Orange	Grapes	Apple	Banana
Apple	Grapes	Apple	Grapes	Mango	Banana	Banana	Mango	Mango
Grapes	Mango	Apple	Orange	Mango	Grapes	Orange	Grapes	Apple
Banana	Orange	Grapes	Grapes	Orange	Mango	Mango	Mango	Mango
Grapes	Apple	Grapes	Banana	Mango	Apple	Banana	Grapes	Orange

(a) Present above description in a table.

(b) Present the table of (a) in a bar diagram.

Lesson 15

Algebraic Expressions

15.0 Review

Discuss the given statements in a groups, Then write it by using variables and present it in the class.

(a) I have 3 more marbles than Bina.

(b) Rima's brother gave her 5 more chocolates on one he has.

(c) Manju spent one fourth part of money she has.

(d) sapana on sold an object at 3 times more price then she had bought it.

(e) The distance from school to my house is 2 km shorter than 3 times the distance from school to the temple.

For example: We can write □ + 3 to the above statement of (a). If we suppose x to the unknown quantity, then it can be written as x + 3. Likewise in (e), if we suppose x to the distance from school to the temple, then the distance from school to my house is (3x-2).

The mathematical quantity whose value may be changed according to the situation is called a variable. Variable is referred to by the symbols as x, y, z,.... The mathematical quantity, whose value is fix is called a constant.

15.1 Algebraic Expression, Terms and Coefficient

Activity 1

Discuss the following questions by observing the given algebric expressions:

(a) $3x + 2$ (b) x (c) $\frac{2}{3}y$

(d) $\frac{x}{3}$ (e) $x + 3y - 2$ (f) $4x$

(a) All the expressions from (a) to (f) above. Based on this, how can we define an algebraic expression?

(b) 3x and 2 are terms in (a). Likewise, x is a term in (b). $\frac{2}{3}$y y is term in (c). Based on this, separate the terms from (d), (e) and (f) by defining the algerbraic terms.

(c) $3x + 2$ is binomial expression but x is monomial expression. Based on this, how many terms are there in $\frac{2}{3}y$, $\frac{x}{3}$, $x + 3y - 2$ and $4x$?

(d) x is a variable in $3x + 2$ and 3 is the coefficient of x but 2 is constant. Likewise, x is a variable in x and 1 is the coefficient of x. Based on this, what is coefficient? Separate coefficient and variable in the remaining algebraic expressions.

A number or a variable or the product of number and variable is called algebraic term. For example: $3x$, 2, x, $\frac{2}{3}y$

An algebraic expression is made by combining one or more algebraic terms. For example : x, $\frac{2}{3}y$, $\frac{x}{3}$, $x + 3y - 2$, $4x$

A number which is multiplied by a variable in any algebraic expression is called coefficient. For example: 3 is called the coefficient of x in $3x + 4y - 5$. 4 is called the coefficient of y. 5 is called a constant.

Example 1

Write how many terms are there in the given algebraic expressions:

(a) $2x + 3$ (b) $8x - 9y + 3$ (c) $10a$

Solution

Here,

(a) Two terms are there in $2x + 3$. Therefore, it is a binomial expression.
(b) Three terms are there in $8x$ - 9y +3. Therefore, it is a trinomial expression.
(c) One term is there in 10a. Therefore, it is a monomial expression.

Example 2

Present the following statements in algebraic expression.

Roji gave Rs. 25 to Ram from her money. Now, how much is left with her?

Solution

Here,

Some money that Roji has = Rs. x (suppose)

Money that she gave to Ram = Rs. 25

Therefore, remaining money = x - 25

Example 3

Write the variable and coefficient of the given expressions separately:

(a) $3y$ (b) $4x + y$

Solution

(a) Here, 3 is the coefficient and y is the variable in 3y.

(b) Here, 4 is the coefficient of x, 1 is the coefficient of y and x, y are the variables in $4x + y$.

Exercise 15.1

1. Separate *x*, y, z, a, b, c as variable or constant in each situation given below:

(a) 'a' represents the number of textbook that you have.

(b) 'y' represents the total number of members that your family have.

(c) 7 is the value of b.

(d) '*x*' represents the number of districts of Nepal.

(e) 'c' represents the age of students that are in your school.

(f) 'z' represents any one positive number.

2. Express each statement given below in algebraic expression:

(a) 2 more than x

(b) 1 less than y

(c) Quantity that comes after dividing 15 by a.

(d) 3 times x and the difference of y

3. Sabin has x marbles. He has won 8 marbles while playing with his friends the whole day of his vacation. Now, how many marbles does he have? Write in algebraic expression.

4. Bijaya's uncle bought y chocolates for Rs. 10 to him. On the same day again, he got same types of 4 chocolates on the occasion of his friend's birthday.Now, how many chocolates does he have? Write in algebraic expression.

5. x students from my school were going for an educational tour. Next day, two times more students to grade 5 had to be taken. How many students in total had to be taken? Write in algebriac expression.

6. Write the coefficient and variable of the given expressions.

(a) $8x$ (b) $7y$ (c) $5xy$ (d) $11a$

7. Write how many terms are there in the given algebraic expressions. And, write their names too.

(a) $8x$ (b) $7x - y$ (c) $m + n$ (d) $x + y - 1$

8. Make an algebraic expression in each situation given below and write its algebraic term:

(a) Binita had x oranges. Her mother gave 3 more oranges to her. Now, how many oranges does she have in total?

(b) Ishan has y amlas. Among them, she gave 8 amlas to Ram. Now how many remaining amlas does she have?

(c) Hark Man has b biscuit. Among them he sold 5 biscuits. Now, how many remaining biscuits does he have?

15.2 Like and Unlike Terms

Activity 2

Study the two boxes given below.

What is the total of 3 yellow balloons and 4 blue balloons?

If we add 3 yellow balloons to 4 blue balloons there will be 7 balloons altogether.

Therer are 3 ants and 4 bees. What is the total?

Here, ant and bee are different. So, there will be 3 ants and 4 bees.

In spite of having different colours in yellow and blue balloons, they both represent the balloon having the same characteristics. So, we can say 7 balloons altogether.

But, ants and bees have different characteristics. So, we have to say 3 ants and 4 bees separately.

Activity 2

Observe the given algebraic expressions:

(a) $3x + 2y + x$ (b) $x - 2y + 5x$

(c) $z + x - 2x$ (d) $9y + 2y + z$

(a) $3x$ and x are like terms, $3x$ and $2y$ or $2y$ and x are unlike terms in $3x + 2y + x$. Likewise, x and $5x$ are like terms, x and $2y$ or $2y$ and $5x$ are unlike terms in $x - 2y + 5x$. Based on this discussion, how can we define like and unlike terms?

(b) Separate the like and unlike terms in $z + x - 2x$ and $9y + 2y + z$.

The objects having the same characteristics are called like objects. The terms having same variables are called like terms. The objects having different characteristics are called unlike objects. The terms having different variables are called unlike term.

Example 1

Which are the like terms in the given expression? Separate them.

$3x, 2y, 4x, 7a, x$

Solution

Here, there are same variables in $3x$, $4x$ and x. Therefore, they are like terms.

Example 2

Which are the like or unlike terms in each algebraic expression given below? Separate them.

(a) $5x + 7x$ (b) $10b + 12c$

(c) $5x^2y + 3xy^2$ (d) $2abc - 5abc$

Solution

(a) $5x$ and $7x$ both are like terms because they both have variable x.

(b) 10b and 12c are unlike term because b is the variable in the first term and c is the variable in the second term.

(c) $5x^2y$ and $3xy^2$ are unlike terms because x^2y are the variables in the first term and xy^2 are the variables in the second term.

(d) 2abc and 5abc are like terms because both of them have the same variables abc.

15.3 Addition and Subtraction of Like Terms

Activity 1

Krishna and Radhika have kept cow and buffalos at home. There are 3 buffalos and 5 cows at Krishna's home. Likewise, there are 4 buffalos and 3 cows at Radhika's home. Based on this situation, discuss the below questions in pair and present your conclusion in the classroom.

(a) How many buffalos were there at Krishna's and Radhika's home altogether?

(b) How many more cows are at Krishna's home than at Radhika's home?

(c) How many cows and buffalos were there at Krishna's and Radhika's home altogether?

Now,

Total number of buffalos at Krishna's and Radhika's home = 3 buffalos + 4 buffalos = 7 buffalos

The number of cows at Krishna's home that are more than at Radhika's home = 5 cows - 3 cow = 2 cows

7 buffalos and 8 cows were there at Krishna's and Radhika's home altogether.

Here, we can say 3 + 4 = 7 buffalos and 5 + 3 = 8 cows in total by adding buffalos and buffalos or cows and cows which are the same animals (like animal). But, we need to write 7 buffalos and 8 cows in the form of addition of buffalos and cows because they are different or unlike animals.

Activity 2

Simplify the given algebraic expression:

(a) $x + 6x$ (b) $2y + z$

(c) $7x - 2y + 3x$ (d) $y + x - 3z$

If the terms are like terms, we can add or subtract. But, if the terms are unlike terms, we can express only as addition or subtraction of the terms while adding or subtracting.

Example 1

Find the sum: $3x$ and $5x$

Solution

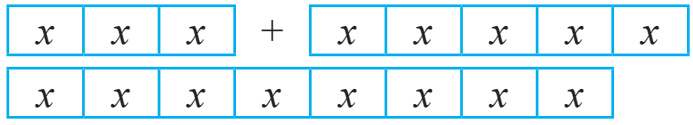
Here,

$3x + 5x$

$= 8x$

Alternative Method

$$\begin{array}{r} 3x \\ +\ 5x \\ \hline 8x \end{array}$$



Example 2

Solve it:

$18a - 6a$

Solution

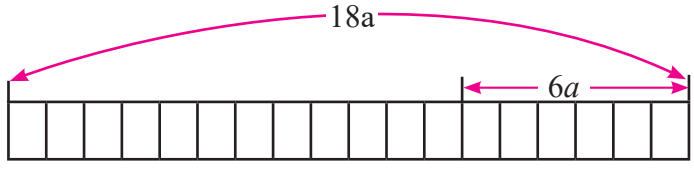
Here,

$18a - 6a$

$= 12a$

Alternative Method

$$\begin{array}{r} 18a \\ -\ 6a \\ \hline 12a \end{array}$$



Example 3

Simplify:

$4a + b + 2a - 4b$

Solution

Here,

$4a + b + 2a - 4b$

$= 4a + 2a + b - 4b$

$= 6a - 3b$

Exercise 15.2

1. Separate the like and unlike terms from the given pair of algebraic terms:

(a) $8x$ and $7x$ (b) $5a$ and $3y$ (c) $7x^2$ and $3x^2$

(d) x, $3x$ and $10x$ (e) $6y^3$ and $3y$ (f) $5xy$ and $3xy$

2. Find the sum:

(a) x र $6x$ (b) $3y$ and $5y$ (c) $5a^2$ and $8a^2$

(d) y, $6y$ and $8y$ (e) $2xy$, $3xy$ and $6xy$ (f) p, 3p and 2p

3. Find the difference:

(a) $5b$ from $3b$ (b) $8x$ from $7x$

(c) 13m – 8m (d) $11xy - 4xy$

4. Simplify:

(a) $a + 3a$ (b) $3m + 4m$ (c) $45p - 13p$

(d) $17n - 3n$ (e) $3x + 4x - 5x$ (f) $19a + a - 3a$

(g) $8b - 2b + 7b$ (h) $4a + 3b - 2a - 5b$

(i) $x + 2y + 3x + 4y$ (j) $17x + 3 + 5x - 2$

(k) $10cd + 12cd$ (l) $30pr - 35pr + 5pr$

(m) $x^2 + xy + 2x^2 + 3xy$

5. Add:

(a) $13c + 8c$ (b) $10c + 8c$ (c) $4a + 5b + 4a + 7b$

(d) $8m + 3n + 2m + n$ (e) $9ab + 5bc + 7ab - 3bc$ (f) $16ab + 5cd + 2ab - 10cd$

6. Subtract:

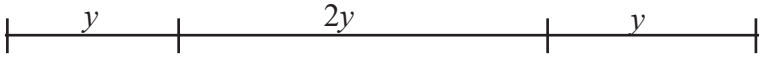
(a) $7m$ from $2m$ (b) $16x$ from $9x$

(c) $7x + 9y$ from $3x + 4y$ (d) $3pq - 2qr$ from $2pq - 4qr$

(e) $14ab - 7pc$ from $9ab + 6pc$

7. Find the total length of each line segment given below:

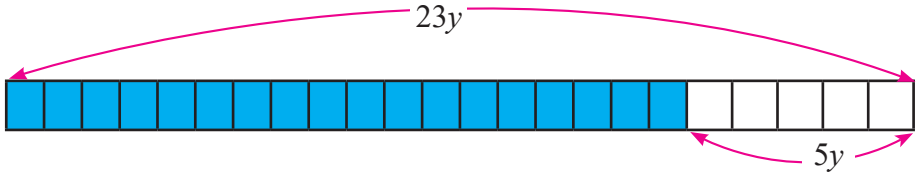
(a) 

(b) 

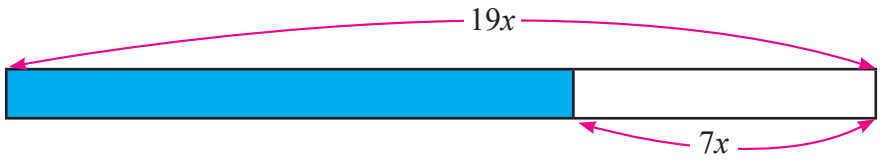
(c) 

8. What will be the length of coloured parts of the given figures:

(a)



(b)



9. What should be added in $x + y$ to make $7x + 3y$?

10. By how much is $7x - 4y + 3z$ greater than $3x - 6y + z$?

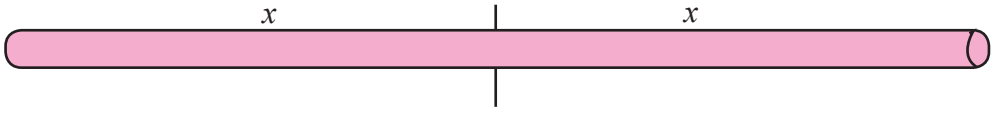
11. What should we add in $4a + 36$ to make it $7a + 116$?

12. What should be added in $2a + 7b + 4c$ to make it $7a + 7b + 6c$?

13. There are 4 boxes Cetamol in a medical store. Again, the shopkeeper bought 8 more boxes of Cetamol. If there are x tablets in a box, then how many tablets does the shopkeeper have?

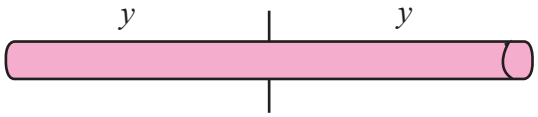
14. Rama sold 3 pieces of sugarcane by dividing it into 4 equal pieces from 8x unit length. Now, how many pieces of sugarcane does she have?

15. Find the length of the stick given in the figure below according to the value of the variables given:

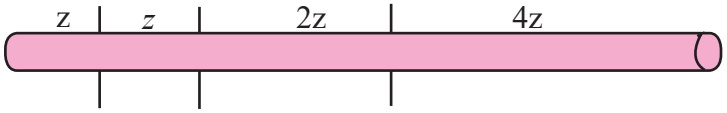


(a) If $x = 12$ cm, what is the length of the stick?

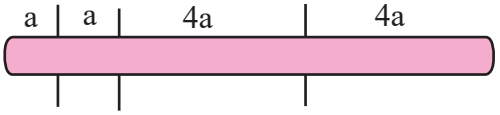
(b) How long is the exact length of the stick if y = 6 cm?



(c) How long is the exact length of the stick if z = 2 cm?



(c) How long is the exact length of the stick if a = 1 cm?



Lesson 16

Equation

16.0 Review

Write the value of □ or letter in each of the given situation. Show your task to your friend for correction.

(a) $3 + \square = 7$

(b) $\square + 5 = 12$

(c) $15 - \square = 10$

(d) $\square - 8 = 2$

(e) $8 \times \square = 40$

(f) $\square \times 3 = 21$

(g) $27 \div \square = 9$

(h) $\square \div 4 = 7$

(i) $15 - x = 7$

(j) $15 \div x = 3$

(k) $15 + x = 23$

(*l*) $25 + \square = 32$

The algebraic equation is a statement in which two algebraic expression are related with equal sign (=).

16.1 Solving Equation

Activity 1

How can we find the value of x in $x + 5 = 15$?

There are 5 coins of one rupees on one side of the given weigh scale balance and 15 coins of one rupees are on another side. The balance has not shown the equal weight on the both sides. What can we do to make it a balance?

We need to add more one rupees coins on 5 coins side. Likewise, if we add 10 more coins on 5 coins, the balance is equal. Therefore, $x = 10$.

Now, there are 15 coins each on both sides of the balance.

(a) If we add 3 coins on both sides each, will the weight scale be on balance?

(b) If we remove 4 coins from both sides each, what will be the situation of the balance?

(c) If both sides have 15 coins each and they are multiplied by 2 on both sides, what will be the condition of the balance?

(d) There are 15 coins on both sides each. If we put only one fifth part of coins on both sides, what will be the situation of scale?

Equality facts

(i) Equality fact of addition: If the same quatity is added on both sides of an equation, two sides are still equal.

(ii) Equality fact of subtraction: If the same quantity is subtracted on both sides of an equation, two sides are still equal.

(iii) Equality fact of multiplication: If both sides of an equation are multiplied by same quantity, two sides are still equal.

(iv) Equality fact of division: If both sides of an equation are divided by same quantity, two sides are still equal.

Example 1

Lakpa had a bag filled with gauva. Among them, he has given 5 gauvas to Dhruba. Now, Lakpa has 7 gauvas remaining. Write it as equation.

Here, we don't know the number of gauvas that Lakpa has on the bag. So, suppose it as x,

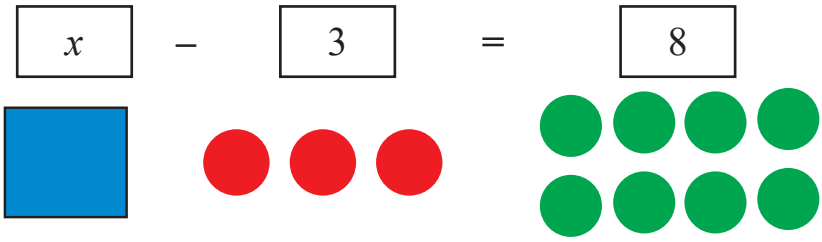
Then, we can write, $x - 5 = 7$. This is the required equation.

Example 2

Find the value of x in $x - 3 = 8$.

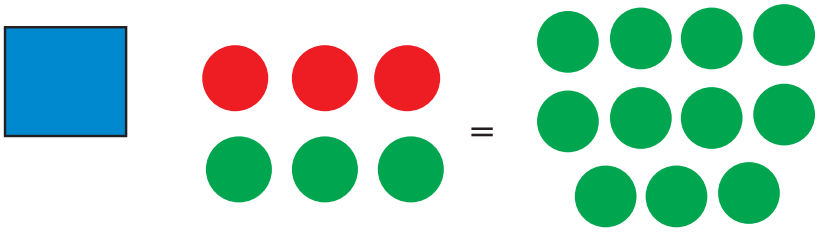
Solution

Here, represent x as a square tile. Use red coloured dots and green coloured dots to represent negative and positive numbers respectively.

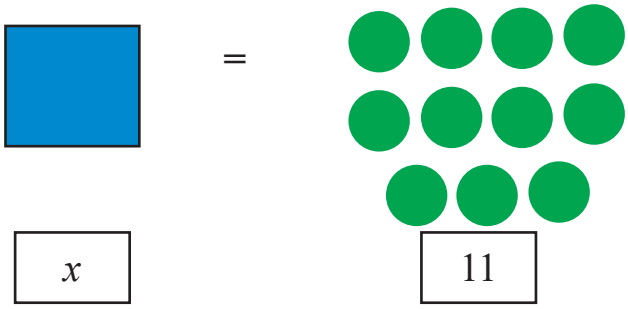


Now, add 3 green coloured dots on both sides.

$$x - 3 + 3 = 8 + 3$$



Remove red and green dots by making pair and write the number of remaining tile and dots by counting.



Hence, the value of x is 11. $\therefore x = 11$

It can be solved as,

$x - 3 = 8$

or, $x - 3 + 3 = 8 + 3$ [$\because$ added 3 on both sides]

or, $x = 11$

Example 3

Solve:

(a) $4x = 12$ (b) $\frac{x}{5} = 4$

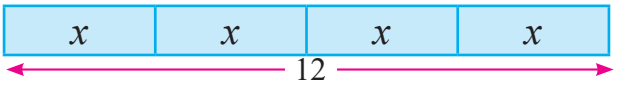
Solution

(a) Here, $4x = 12$

$4x$ is equal to $x + x + x + x$

Therefore, to drawing model sketch,

Now,



According to figure, if 4 equal parts are added, the sum is 12. Similarly, we need to divide 12 by 4 in order to make one part.

Therefore, $12 \div 4 = 3$

Hence, $x = 3$

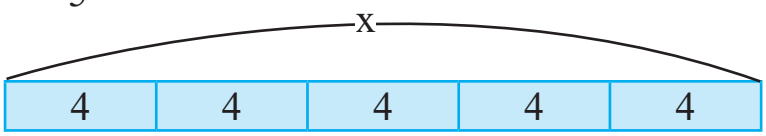
It can also be solved as,

$4x = 12$

or, $\frac{4x}{4} = \frac{12}{4}$ [$\because$ divided by 4 on both sides]

or, $x = 3$

(b) $\frac{x}{5} = 4$



According to the figure, if we divide x into 5 equal parts, one part should be 4.

Hence, $x = 20$

Alternative method,

$\frac{x}{5} = 4$

or, $\frac{x}{5} \times 5 = 4 \times 5$ [$\because$ multiplied by 5 on both sides]

Example 4

Solve:

(a) $x - 7 = 10$ (b) $x + 3 = 9$

(c) $7x + 1 = 56$ (d) $\frac{y}{2} = 8$

Solution

(a) Here,

$x - 7 = 10$

or, $x - 7 + 7 = 10 + 7$ ($\because$ added 7 on both sides)

$\therefore x = 17$

(b) Here,

$x + 3 = 9$

or, $x + 3 - 3 = 9 - 3$ ($\because$ added 3 on both sides)

$\therefore x = 3$

(c) Here,

$7x = 56$

or, $\frac{7x}{7} = \frac{56}{7}$ (∵ divided by 7 on both sides)

$\therefore x = 8$

(d) Here,

$\frac{y}{2} = 8$

or, $\frac{y}{2} \times 2 = 8 \times 2$ (∵ added 2 on both sides)

$\therefore y = 16$

Exercise 16

1. Solve the given equations by using equality facts of equation:

(a) $a + 3 = 5$ (b) $x + 4 = 9$ (c) $z - 6 = 2$

(d) $x - 4 = 12$ (e) $10 - x = 4$ (f) $6 + x = 17$

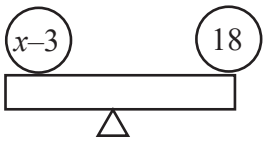
(g) $x - 5 = 12$ (h) $x + 7 = 10$ (i) $x + 10 = 21$

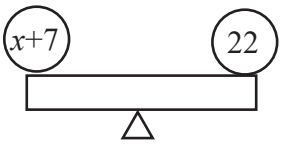
(j) $9 = x - 4$ (k) $48 = x + 15$ (l) $7y = 28$

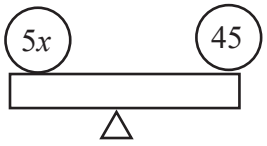
(m) $11a = 44$ (n) $9x = 36$ (o) $\frac{z}{5} = 11$

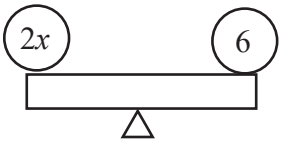
(p) $\frac{x}{7} = 7$ (q) $\frac{x}{12} = 8$

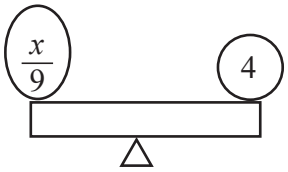
2. If each of the given see-saw is balanced being parallel to the ground, what is the value of x ?

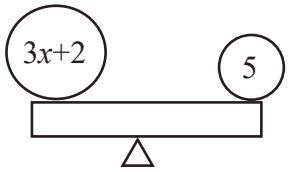
(a) 

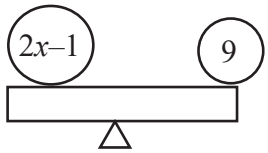
(b) 

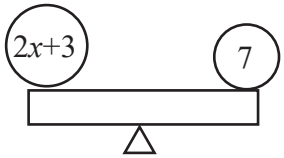
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

3. Solve each of the situations given below by making equations:

(a) Sum is 9 if we add x to 5.

(b) The difference is 5 if we subtrat 9 from y.

(c) Product is 32 if we multiply 8 and y.

(d) Quetient is 9 if we divide p by 6.

4. (a) Manu has Rs. x. She has got 330 after giving Rs. 50 to her son. How much money did she have at the beginning?

(b) A washerman has got Rs. 900 after he washed x coats at the rate of Rs. 300. How many coats did he wash?

(c) Pokhara had y *ml* rainfall on Saturday and the next day it had (y -1) *ml* rainfall. If the total rainfall was 43ml, how many ml of rainfall did Pokhara have on Saturday?

(d) One stick is $2x$ m and another stick is $x + 2$ m long. If total length is 17m, how long is each stick?

(e) If Rs. 5 is added to 2 times of Ram's money and the sum is 7 rupees, how much rupees does he have?

(f) The number of the boy students in a school is 2 times more than the girl students. If there are 300 students in the school, what is the number of the girl students?

Project work

Take an appropriate number of corn cernels (dana) or leaves that can be counted. Each of you packs the kernelas or leaves with 10 pieces each. Now, mix the packs and remaining kernels are there? Write them in algebraic terms and equations and present in the class.

Mixed Exercise

1. Simplify:

(a) $3x + 4x$ (b) $2x - 3y + 3x + 4y$

(c) $3y + 4y - 5y$ (d) $4x - 5a + 6a - 3x$

(e) $3a - 4b + 5a + 6b$ (f) $9x - 4x + 9y + 8y$

2. Solve:

(a) $2x + 3x = 15$ (b) $3x + m = 12$ (c) $2y + 5y = 15$

(d) $8x = 24 + 5x$ (e) $5z - 2z = 4$ (f) $6z = 9 + 2z$

(g) $4m - 8 = 2m$ (h) $5p - 3 = 2p$ (i) $5x + 7 = 22$

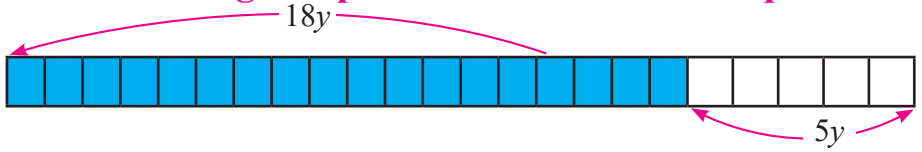
(j) $4m - 8 = 2m$ (k) $3x + 11 = 14$ (l) $3x - 4 = 18$

(m) $2x + 5 = 9$ (n) $5x + 4 = 2x + 6$ (o) $x - 100 = 0$

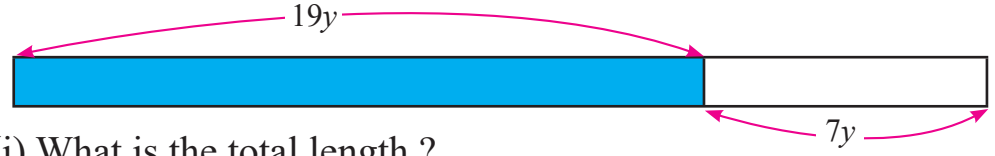
(p) $7x + 5 = 9 + 5x$ (q) $7x - 2 = 4x + 10$

3. Observe the given pictures and answer the questions.

(a)



(b)



(i) What is the total length ?

(ii) How much is the coloured part greater than the non-coloured part?

(iii) If y = 2 cm, then what will be the total length?

4. An iron rod with the length of 5y cm is welded with another iron rod of the same size having 2 times the length of the first one. But, 2y cm length is cut out because it was so longer than required.

(a) What is the meaning of 2 times of 5y cm length?

(b) What was the total length of the rod before it was cut?

(c) What is the remaining length after it was cut?

(d) If y = 6 cm, then what is the length of the rod in centimeter before it was cut?

5. Bikas gave 5 oranges to Rama and ate 4 himself among x oranges in a bag. Now it, he has 10 oranges remaing then how many oranges were there before?

6. Bindu distributed her y ruppees money to her three children equally. If each got Rs. 400, then how many ruppees did she distribute?

7. Pasang has collected z rupees money and kept in a piggy bank (khutruke). If he kept Rs. 300 recin the bank and there was Rs. 1230 in total. How much money was collected before?

8. Hari has 2 times more money than Ram has. If we add the money both of them have, it is Rs. 300.

(a) If Ram has x rupees, then write the rupees that Hari has in terms of x.

(b) Write the equation according to question no. (a).

(c) How much money does Ram have?

(d) How much money does Hari have?

9. Sadira and Suprim are siblings. Now, Suprim is *x* years old and Sadira is 6 years older than Suprim. The total of there age is 18 years.

(a) Write Sadira's age in terms of *x* years.

(b) Are the ages of the siblings like terms?

(c) What is the age of Suprim? Find.

(d) Find Sadira's age.

(e) If Sadira's age was 6 times more than Suprim's age, then what will be Sadira's age? Find.